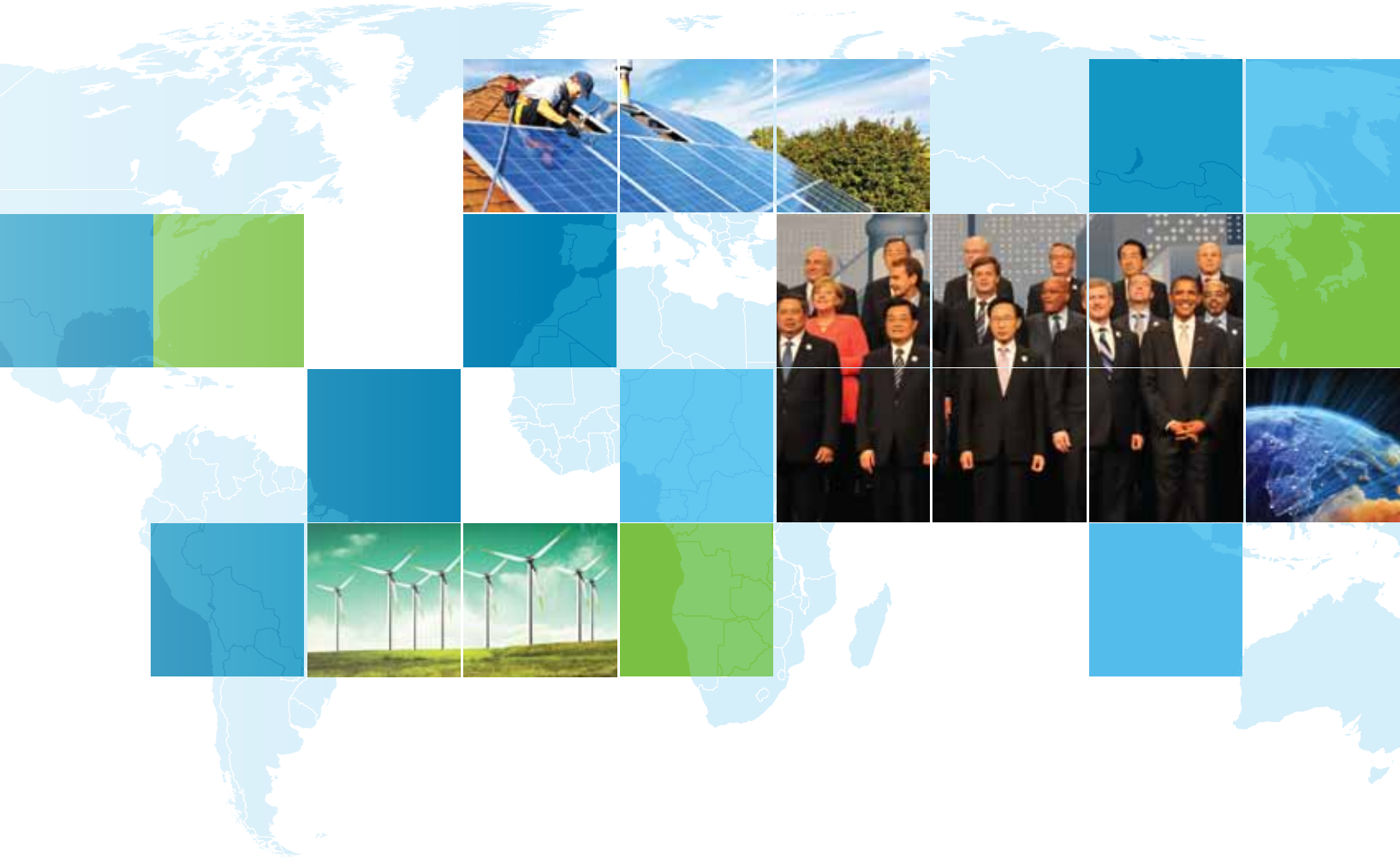
WHO'S WINNING

THE CLEAN ENERGY RACE?

EDITION 2010

G-20 INVESTMENT POWERING FORWARD



THE PEW CHARITABLE TRUSTS

the CleanEnergy Economy

Repowering Jobs, Businesses and Investments Across America

THE PEW CHARITABLE TRUSTS

The Pew Charitable Trusts applies the power of knowledge to solve today's most challenging problems. Pew employs a rigorous, analytical approach to improve public policy, inform the public and stimulate civic life. We partner with a diverse range of donors, public and private organizations and concerned citizens who share our commitment to fact-based solutions and goal-driven investments to improve society. For additional information on The Pew Charitable Trusts, please visit www.PewTrusts.org

THE PEW ENVIRONMENT GROUP

The Pew Environment Group promotes practical, meaningful solutions to some of the world's most pressing environmental problems.

Joshua Reichert, Managing Director, Pew Environment Group

Phyllis Cuttino, Program Director, Clean Energy Program

David Catarious, Research Director, Clean Energy Program

Gavin Feiger, Fellow, Clean Energy Program

Jessica Frohman Lubetsky, Senior Associate, Clean Energy Program

Laura Lightbody, Manager, Clean Energy Program

Brendan Reed, Associate, Clean Energy Program

For additional information on the Pew Environment Group, please visit www.PewEnvironment.org

ABOUT THE REPORT

Who's Winning the Clean Energy Race? 2010 Edition: G-20 Investment Powering Forward was developed for public informational and educational purposes. It is an update of The Pew Charitable Trusts' March 2010 report *Who's Winning the Clean Energy Race? Growth, Competition and Opportunity in the World's Largest Economies*, which examined 2009 clean energy, finance and investment in the countries that make up the Group of Twenty (G-20).[1] This report also follows on Pew's December 2010 report *Global Clean Power: A $2.3 Trillion Opportunity*, which examines scenarios for private investment in renewable energy assets in G-20 nations over the next decade. Pew's international investment research complements ongoing efforts by the Pew Environment Group and the Pew Center on the States to chronicle the extent of jobs, businesses and investments in America's clean energy economy.

Underlying data for this report were compiled for the Pew Environment Group by Bloomberg New Energy Finance, the world's leading provider of news, data and analysis on clean energy and carbon market finance and investment. Bloomberg New Energy Finance's global network of 100 analysts located across Europe, the Americas, Asia and Africa continuously monitor market changes, deal flow and financial activity, allowing instantaneous transparency into the clean energy and carbon markets.

A full description of the methodology and parameters employed for this report can be found in Appendix I.

ACKNOWLEDGEMENTS

We are grateful to our research collaborators at Bloomberg New Energy Finance, led by Ethan Zindler, with Nicole Aspinall, Victoria Cuming, Anna Czajkowska, Stuart Davis and Krishnan Shakkottai, as well as special thanks to Michael Liebreich. We would also like to thank our Pew colleagues – Tracy Schario, Kymberly Escobar, Peter Dykstra, Pete Janhunen and Shannon Pao, as well as Jonathan Rich of JCR Communications. We thank Alziro Braga Graphic Design and Juan Thomassie for graphic assistance and David Harwood of Good Works Group for his work in preparing this report.

[1] The Group of Twenty was established in 1999 to bring together leading industrialized and developing economies to discuss key global economic issues. The G-20 is made up of the finance ministers and central bank governors representing the European Union and 19 countries: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom and the United States. No data are provided for Russia and Saudi Arabia because clean energy investment there is negligible.

WHO'S WINNING
THE CLEAN ENERGY RACE?

CONTENTS

Pictures in the Cover:

1. Worker installing solar panels: Shutterstock / Elena Elisseeva
2. Presidents posing for official picture: The British Prime Minister's Office
3. Planet: Shutterstock / 1xpert
4. Wind Turbines: Shutterstock / majeczka

the CleanEnergy Economy
Repowering Jobs, Businesses and Investments Across America

THE PEW CHARITABLE TRUSTS

EXECUTIVE SUMMARY

The clean energy race is on. The investment and finance data presented in this report show that countries are jockeying for a leadership position in this growing and increasingly competitive sector. Countries with clear, consistent and constructive clean energy policies are powering investment forward.

This report examines key financial, investment and technological trends related to clean energy in the world's leading economies, also known as the Group of Twenty (G-20). Our primary focus is on investment, which is the fuel that propels the innovation, commercialization, manufacturing and installation of clean energy technologies. The data have been compiled and reviewed by Pew's research partner, Bloomberg New Energy Finance, a market research firm focused on renewable energy.

Our research shows that the clean energy sector around the world has roared back from flat recessionary levels, increasing 30 percent from 2009 to achieve a record $243 billion[2] worth of finance and investment in 2010. More than 90 percent of all clean energy investments were directed to companies and projects in the G-20. Excluding research and development funding, clean energy finance and investment in the G-20 countries totaled $198 billion, 33 percent more than was invested in 2009.

Collectively, the European region was the leading recipient of clean energy finance, attracting a total of $94.4 billion. Europe's leadership position was solidified by more than 100 percent growth in investment in small-scale solar installations in Germany and Italy. Rising among the ranks of top-10 countries for private clean energy investment, Germany and Italy attracted $41.2 billion and $13.9 billion, respectively.

Although small-scale solar energy investments helped Europe maintain its position as the leading region for clean energy finance in 2010, the Asian region is closing the gap rapidly and is expected in the coming months and years to become the center of gravity for clean energy investment. Overall clean energy investment in the Asian region increased 33 percent to $82.8 billion in 2010.

Asia/Oceania's emergence is fueled in large part by the rapid rise of China as the world's clean energy superpower. Private investment in China's clean energy sector increased by 39 percent in 2010 to a world

[2] All monetary values are 2010 United States dollars (USD) unless otherwise noted. This figure includes all investment – public and private (including research and development) and G-20 as well as non-G-20 countries.

The British Prime Minister's Office

record $54.4 billion. China also is the world's leading producer of wind turbines and solar modules. In 2009, it surpassed the United States as the country with the most installed clean energy capacity.

The Americas region is a distant third in the race for clean energy investment, attracting $65.8 billion overall in 2010. Investments in the United States rebounded 51 percent over 2009 levels to reach $34 billion, but the United States continued to slide down the top 10 list, falling from second to third. Given uncertainties surrounding key policies and incentives, the United States' competitive position in the clean energy sector is at risk. Growth is sharper in Latin America, where private clean energy investment in Argentina increased by 568 percent and in Mexico by 273 percent, the highest growth rates among G-20 members.

Technologically, 2010 investments notably increased for solar energy, particularly for small-scale and residential projects. In the G-20, a record $79 billion was invested by the private sector in solar technologies, facilitating the installation of more than 17 gigawatts (GW) of new generating capacity. Compared with 2009, solar energy investments in 2010 increased by 53 percent, while investments in the wind sector increased by a more modest 34 percent. Still, wind energy remains the favored technology for private investment in the G-20 countries, accounting for 48 percent of total investments, or $95 billion.

Clean energy funding allocated by governments to help stimulate growth in response to the global economic recession rose sharply in 2010 to $75 billion, from $20 billion the prior year. Corporate and government research and development funding increased globally by 24 percent to $35 billion. Venture capital/private equity funding in the G-20 also rebounded strongly in 2010, up 26 percent over the previous year to $8.1 billion. Investment in G-20 small-scale distributed capacity rose 100 percent in 2010 to $56.4 billion.[3]

Installation of 40 GW of wind and 17 GW of solar helped drive worldwide clean power generating capacity to 388 GW in 2010.

This report documents the continued growth and dynamism of clean energy investment in the world's leading economies. It follows recent Pew research showing that policy priority for clean energy is well-placed: Investment in clean power assets alone could reach $2.3 trillion over the 2010-20 period.[4] Countries that succeed in attracting investment can realize the economic, security and environmental benefits of the global race to harness clean, renewable energy sources.

[3] Small-scale distributed capacity investments refers to solar projects of less than 1 megawatt (MW).
[4] Global Clean Power: A $2.3 Trillion Opportunity, The Pew Charitable Trusts, December 2010. www.PewEnvironment.org/CleanEnergy

KEY FINDINGS

GLOBAL INVESTMENT GROWS TO RECORD $243 BILLION

Worldwide, the clean energy sector roared back from flat recessionary levels, increasing 30 percent above 2009 levels to achieve a record $243 billion worth of finance and investment in 2010.

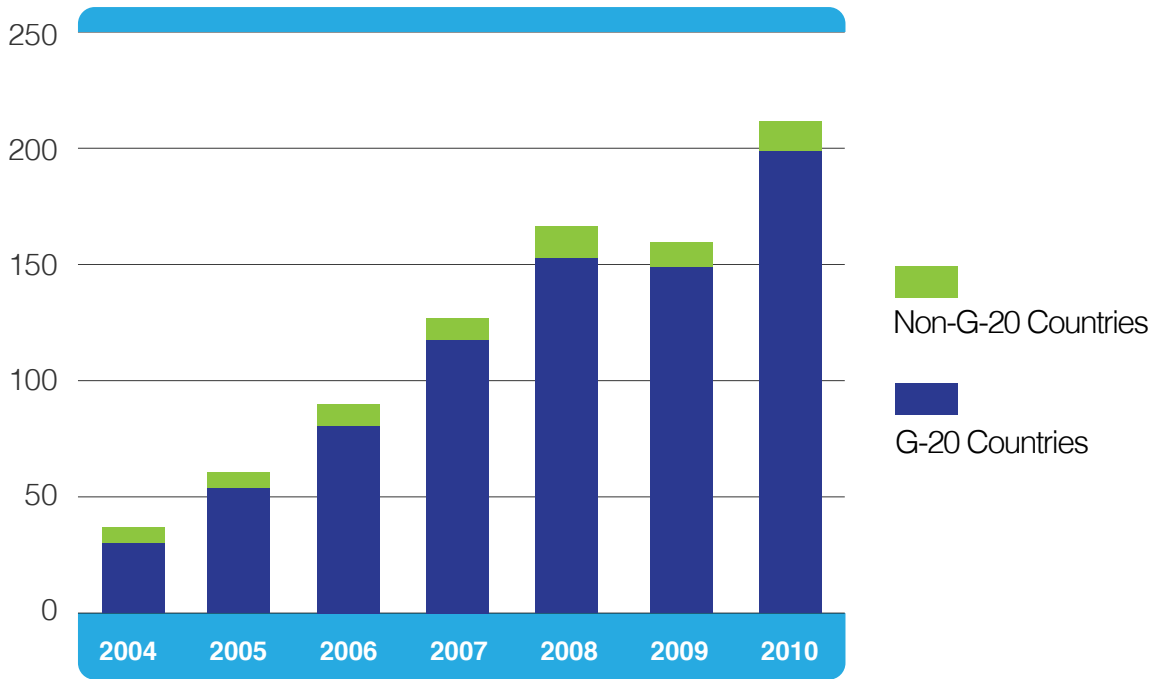
Worldwide investments, excluding research and development in clean energy are 630 percent greater than they were seven years ago (Figure 1), and there have been notable shifts in global competition as investment moves from established markets in the developed countries to dynamic, emerging markets in the developing world.

With more than 90 percent of worldwide investment, the G-20 members continue to dominate the clean energy landscape. Excluding basic research and development, $198 billion was invested last year in the G-20's clean energy sector. Taken together, G-20 clean energy investments in 2010 increased 33 percent over 2009 levels.

ASIA RISING

Clean energy investment in the Asia/Oceania region continued its sharp rise, increasing 33 percent in 2010 to $82.8 billion. In 2009, this region surpassed the Americas for the first time;

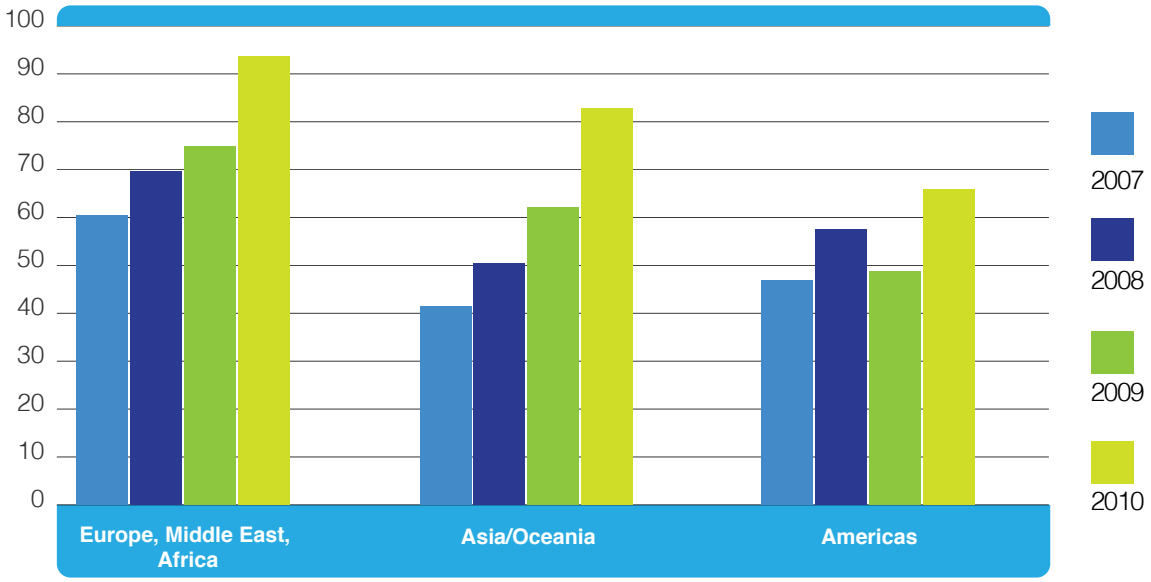
FIGURE 1: GLOBAL AND G-20 CLEAN ENERGY INVESTMENT, 2004-10 (BILLIONS OF $)



* Does not include research and development investments

in 2010, investment in Asia/Oceania grew faster than in the European Region, narrowing the gap between the two regions and edging Asia closer to becoming the world's top destination for clean energy finance and investment. Still, a surge in financing for small-scale solar energy projects enabled Europe to hold the lead for investment in 2010, attracting $94.4 billion. Although a distant third, clean energy investment in the Americas grew 35 percent to $65.8 billion.

FIGURE 2: TOTAL INVESTMENT IN CLEAN ENERGY BY REGION 2007-10 (BILLIONS OF $)



Shutterstock / Caroline Eibl

BIG NUMBERS FOR SMALL PROJECTS

Small distributed capacity is associated with residential scale solar projects of less than 1 megawatt (MW). Purchases of small-scale, distributed, clean energy technologies were a new and important force driving clean energy investment to record levels in 2010. Investment in small-scale projects among G-20 members grew by 100 percent, doubling annual investment to $56.4 billion. A massive surge in rooftop solar energy projects in Germany accounted for more than half of all small-scale investments. Significant investment in small-scale and residential projects also occurred in Japan, the European Union (especially France and Italy) and the United States.

FEED-IN TARIFF POLICIES DRIVE CLEAN ENERGY INVESTMENTS

Feed-in tariffs (FITs) are a policy mechanism used by local and national governments around the world to spur deployment of clean energy. Although they are novel in the United States, FITs have been effectively harnessed in Europe and other key markets.

An analysis by the United States Department of Energy's National Renewable Energy Lab estimates that 75 percent of solar photovoltaic deployments and 45 percent of wind projects globally have been motivated by FITs.

FITs provide investors with returns that are clear and stable. Typically, these programs involve specified renewable energy projects (e.g., solar and/or wind) with long-term power purchase agreements at an agreed price. The costs of FITs are usually spread throughout the utility rate base, on the theory that all consumers benefit from the security, environmental and other benefits associated with deployment of renewable energy.

As this report documents, Germany and Italy have used FITs to attract significant new investment in solar power projects, vaulting these nations to leadership positions in the 2010 clean energy race. The explosive growth in investment has led Germany and other nations to moderate the extent of the incentive in order to avoid a bubble market and sharp increases in consumer electricity bills. Still, Germany's favorable and effective FIT policy is expected to encourage deployment of as much as 8 GW of solar power. Italian policymakers recently indicated that the nation's FIT program will continue unchanged in 2011.

CLEAN ENERGY TARGETS HELP NATIONS ATTRACT INVESTMENT

There are a variety of policy tools that governments can use to encourage clean energy investment and development. To frame national clean energy goals, renewable energy targets have been employed by numerous governments. Clean energy targets can take many forms, including aspirational national objectives; nationwide requirements that a percentage of total energy be derived from renewable sources; goals for installation of a certain amount of solar or wind generating capacity; or utility-level requirements for clean energy production.

As of 2010, at least 85 countries had established a clean energy target of one form or another.[5] Examples include the European Union's goal of securing 20 percent of final energy from renewable sources and China's aim to deploy 20 GW of solar energy by 2020.

Renewable electricity standards (also called renewable portfolio standards) have been adopted in at least 30 U.S. states and at least 10 countries. Renewable electricity standards require utilities to obtain a minimum percentage of total electricity generated from renewable sources. Renewable electricity standards are an important signal to investors that there will be long-term demand for renewable energy, making investment in the sector attractive.

[5] REN21, Renewables 2010: *Global Status Report*, P. 11, http://www.ren21.net/Portals/97/documents/GSR/REN21_GSR_2010_full_revised%20Sept2010.pdf

G-20 SOLAR INVESTMENTS SURGE, WIND REMAINS INDUSTRY LEADER

Among the various clean energy technologies, the solar sector grew the fastest, with investments increasing 53 percent over 2009 levels. Total 2010 investment in solar energy reached $79 billion, and a record 17 GW of solar generating capacity was installed last year, increasing global installed capacity by 70 percent over 2009 levels. The solar sector accounted for 40 percent of total clean energy investments in 2010, further indicating that rapidly declining prices and generous feed-in tariffs for solar are making these technologies an attractive investment option.

Wind investment levels increased by 34 percent in 2010, and wind energy remains the leading recipient of clean energy investments. In 2010, $95 billion was invested by G-20 members in the wind sector, with one-third of that total arriving in the fourth quarter. Low prices for natural gas, especially in the United States, undercut wind energy's competitive pricing with other fossil fuels. Still, investments in wind helped drive the addition of 40 GW of generating capacity and accounted for 48 percent of the annual clean energy investments in 2010. China installed record 17 GW of wind energy in 2010. Installations in the United States decreased 50 percent from 2009 to 5 GW. Offshore wind investments continue to grow, with important projects undertaken off the coast of Massachusetts in the United States and in the territorial waters of Belgium and Germany.

Among the other clean energy subsectors, biofuels was notable for its ongoing slump. The 2010 investment of $4.7 billion was the lowest since 2005, reflecting the fact that first-generation biofuels production capabilities exceed demand in a number of key markets, and second-generation biofuels are not sufficiently advanced for large-scale commercial deployment.

FIGURE 3: G-20 INVESTMENT BY TECHNOLOGY 2004-10 (BILLIONS OF $)

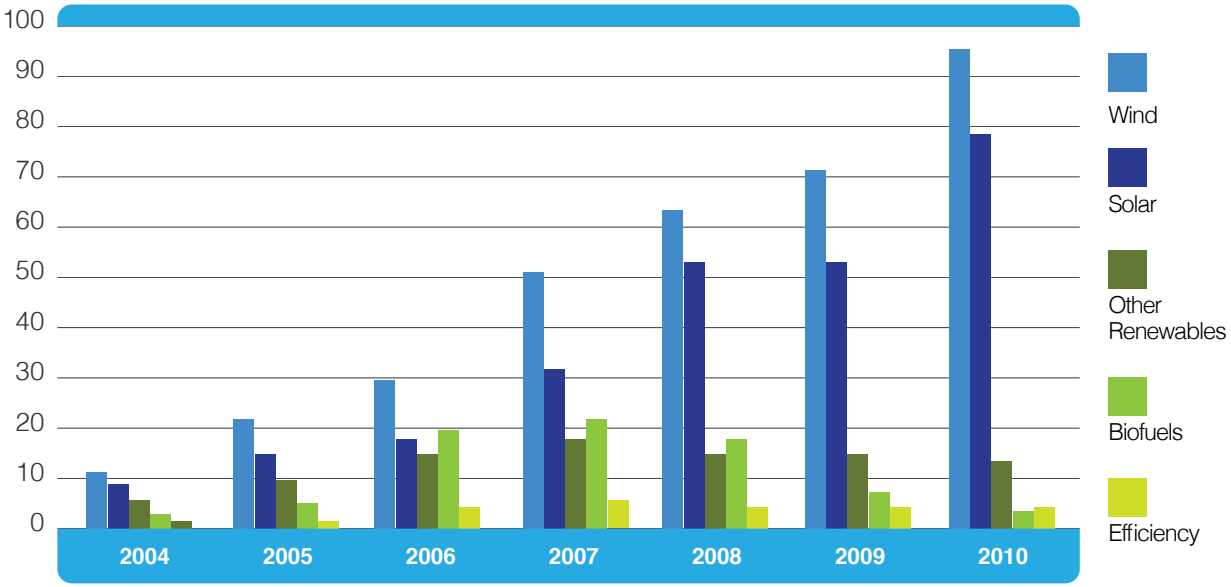
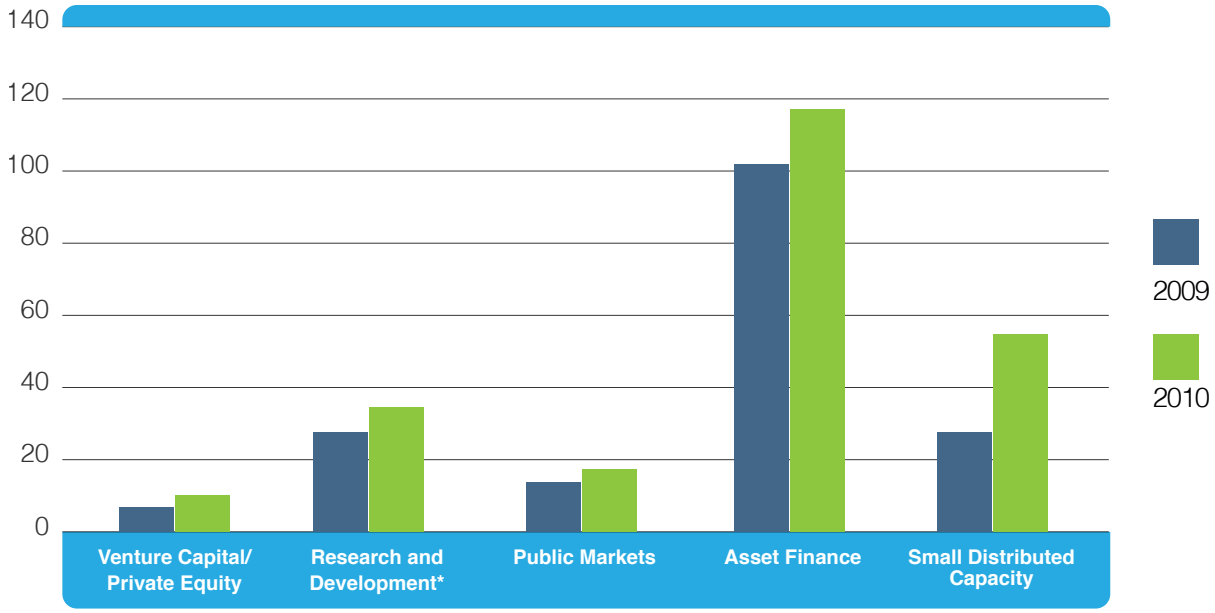


FIGURE 4: G-20 INVESTMENT BY FINANCING TYPE, 2009 VS. 2010 (BILLIONS OF $)



* Research and development figures represent total global funding

VENTURE CAPITAL/PRIVATE EQUITY INVESTMENTS REBOUND

After a dismal 2009, G-20 venture capital/private equity investments in the clean energy sector increased 27 percent to $8.1 billion in 2010. Leading venture capital investments included stakes of $400 million in the Pattern Energy Group (wind); $350 million in Better Place (electric vehicle charging infrastructure); and $150 million in Bright Source Energy (solar). The scale of the leading clean energy venture capital offerings compare favorably with highly publicized offerings in other sectors, such as the $200 million offering in late 2010 for the online social networking and microblogging site Twitter.

Asset financing still accounts for 60 percent of all clean energy investments, or about $118 billion in 2010, up 15 percent over 2009 levels. Public market financing recorded 27 percent growth in 2010, to $15.9 billion, as companies launched public stock offerings to raise capital for expansion.

INSTALLED CLEAN ENERGY CAPACITY APPROACHES 400 GW

The leading clean energy technologies reached record capacity additions in 2010, with annual wind capacity increasing by nearly 40 GW, and solar capacity more than doubling over record 2009 installations to 17 GW. Total worldwide clean energy generating capacity has almost doubled in the past three years in response to strong policies and incentives, as well as declining cost structures.

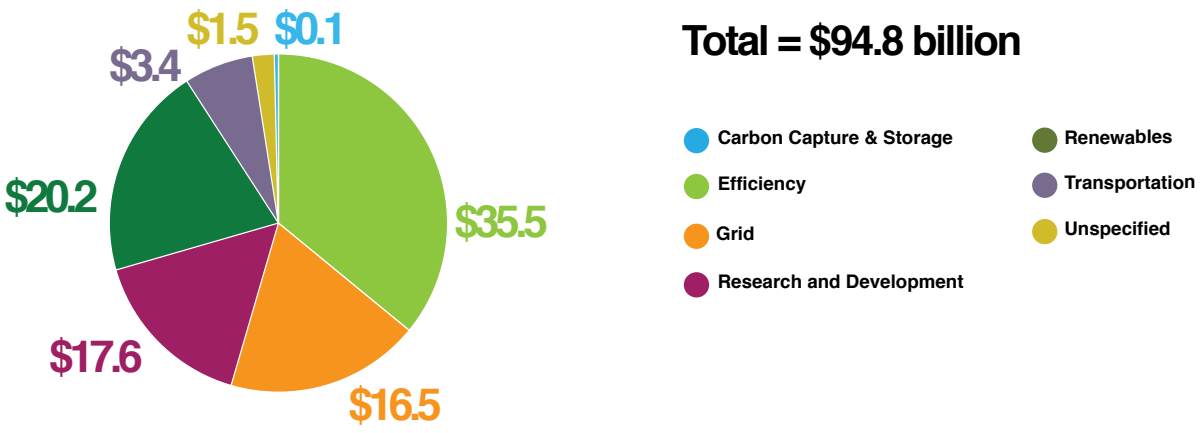
FIGURE 5: TOTAL WORLDWIDE INSTALLED CLEAN ENERGY CAPACITY BY TECHNOLOGY (AS OF 2010)

Wind	193 GW
Small-Hydro	80 GW
Biomass and Waste-to-Energy	65 GW
Solar	43 GW
Geothermal	7 GW
Marine	0.27 GW
Total	**388 GW**

STIMULUS FUNDING GROWS IN 2010[6]

A dozen governments around the world have prioritized clean energy investments as part of economic recovery and stimulus initiatives undertaken in response to the global economic crisis of 2008-09. Governments allocated more than $194 billion for clean energy efforts in stimulus plans, but only 10 percent of that amount reached the sector in 2009. In 2010, stimulus funding for clean energy efforts more than tripled to $74.5 billion, led by sharply increased funding for projects in five G-20 countries: the United States, China, Germany, Japan and South Korea. Thirty-seven percent of stimulus funding spent to date has been directed to energy efficiency programs, 21 percent to renewable energy and 17 percent to smart grid. Another 19 percent of stimulus funding has been allocated by governments for research and development efforts. Although 2010 was the peak year for clean energy stimulus funding, more than one-third ($69 billion) of the $194 billion pledged to date is expected to be spent in 2011.

FIGURE 6. TOTAL STIMULUS FUNDING TO DATE, BY SECTOR (BILLIONS OF $)



[6] Government stimulus funding is not included in the G-20 private investment figures presented in this report.

WHO'S WINNING THE CLEAN ENERGY RACE?

In the first decade of the 21st century, clean energy grew from niche applications into a worldwide industry that now accounts for annual power additions of more than 60 GW. The rapid growth and considerable size of the still-youthful industry have captured the attention of investors, inventors and policymakers alike. With the size of the industry quintupling in less than a decade, countries are now adopting policies to spur finance and investment, increase manufacturing and gain competitive advantage in sectors and regions. Overall, it is clear that the center of gravity for clean energy investment is shifting from the West (Europe and the United States) to the East (China, India and other Asian nations).

FIGURE 7: INVESTMENT BY COUNTRY AND SECTOR, 2010 (BILLIONS OF $)

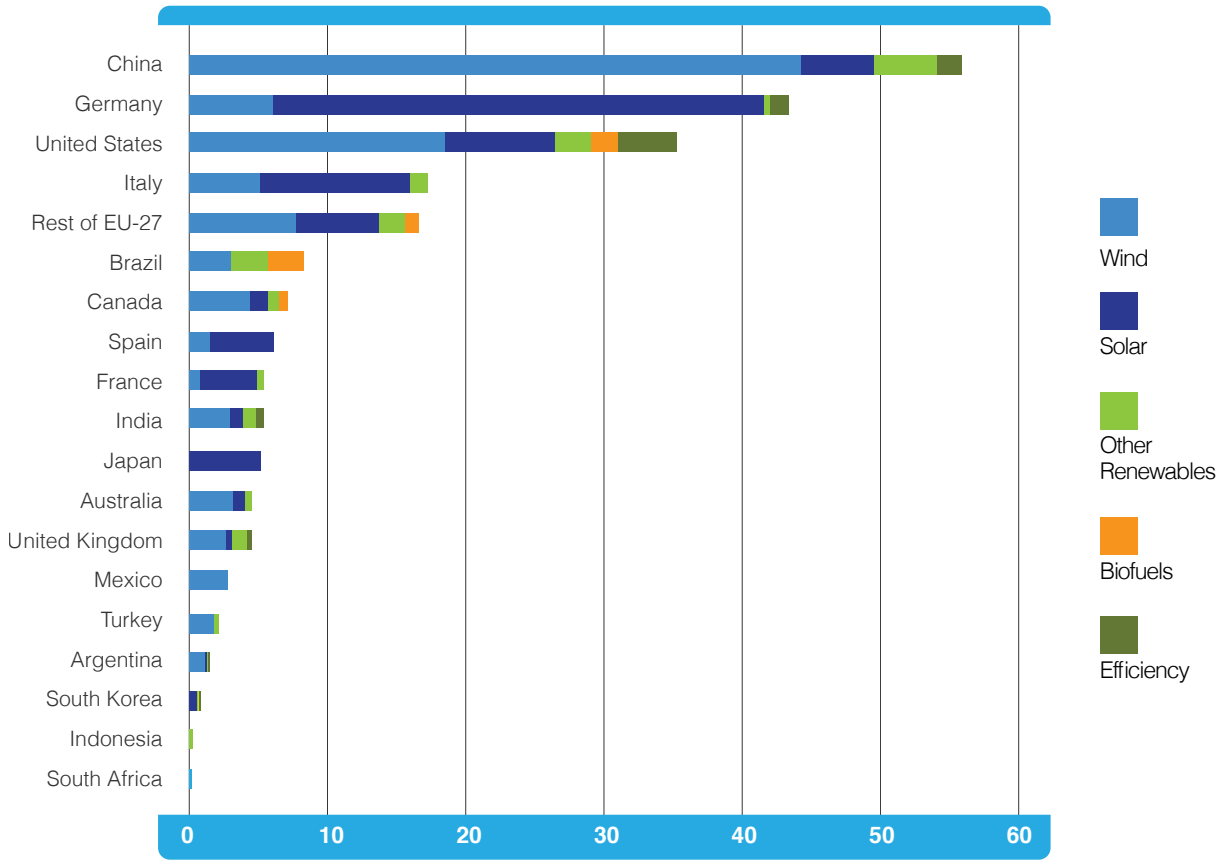


FIGURE 8: INVESTMENT BY COUNTRY AND FINANCING TYPE, 2010 (BILLIONS OF $)

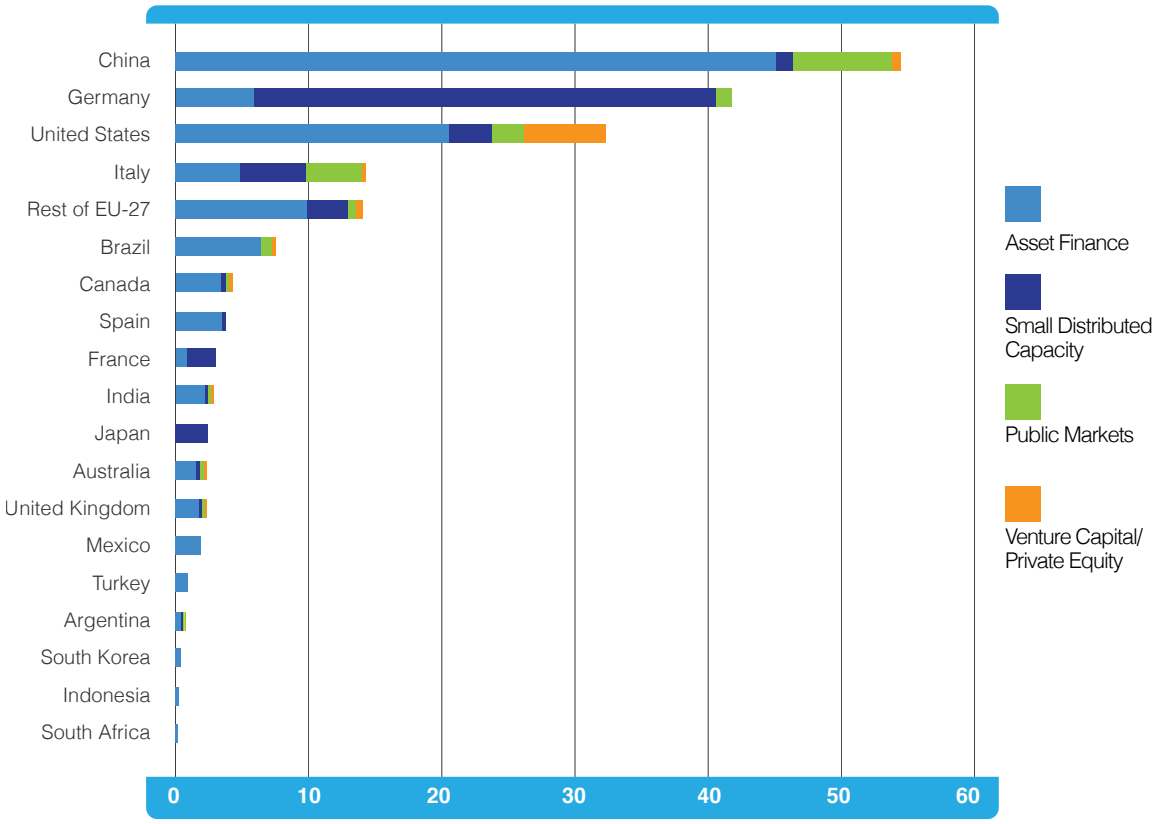


FIGURE 9: TOP 10 IN CLEAN ENERGY INVESTMENT, 2010

2010 Rank	Country	2010 Investment (billions of $)	2009 Investment (billions of $)	2009 Rank
1	China	54.4	39.1	1
2	Germany	41.2	20.6	3
3	United States	34.0	22.5	2
4	Italy	13.9	6.2	8
5	Rest of EU-27	13.4	13.3	4
6	Brazil	7.6	7.7	7
7	Canada	5.6	3.5	9
8	Spain	4.9	10.5	6
9	France	4.0	3.2	12
10	India	4.0	3.2	11

FIGURE 10: TOP 10 ONE-YEAR GROWTH IN INVESTMENT (2010 VS. 2009)

Rank	Country	1-Year Growth Rate
1	Argentina	568%
2	Mexico	273%
3	Italy	124%
4	Australia	104%
5	Germany	100%
6	Canada	61%
7	U.S.	51%
8	China	39%
9	France	26%
10	India	25%

FIGURE 11: TOP 10 FIVE-YEAR GROWTH IN INVESTMENT, 2005-10

Rank	Country	5-Year Growth Rate
1	Turkey	190%
2	Argentina	115%
3	South Africa	94%
4	Indonesia	89%
5	China	88%
6	Brazil	81%
7	Mexico	74%
8	Italy	71%
9	South Korea	62%
10	Rest of EU-27	62%

FIGURE 12: TOP 10 INVESTMENT INTENSITY (CLEAN ENERGY INVESTMENT PER $ GDP)

Rank	Country	Intensity
1	Germany	1.4%
2	Italy	0.79%
3	China	0.55%
4	Canada	0.42%
5	Australia	0.37%
6	Spain	0.36%
7	Brazil	0.35%
8	Rest of the EU-27	0.30%
9	United States	0.23%
10	France	0.15%

FIGURE 13: TOP 10 IN INSTALLED RENEWABLE ENERGY CAPACITY (GW)

Rank	Country	Capacity
1	China	103.36
2	United States	57.99
3	Germany	48.86
4	Rest of EU-27	39.80
5	Spain	27.78
6	Japan	25.96
7	India	18.65
8	Italy	16.66
9	Brazil	13.84
10	France	9.57

FIGURE 14: TOP 10 FIVE-YEAR GROWTH IN RENEWABLE ENERGY CAPACITY, 2005-10

Rank	Country	Percentage Increase
1	China	106%
2	South Korea	88%
3	Turkey	85%
4	Germany	67%
5	Rest of EU-27	45%
6	Italy	45%
7	Japan	45%
8	Brazil	42%
9	France	42%
10	Spain	39%

"The State Council has defined the strategic position of clean energy industries. This will ensure long-term stability of policies essential to clean energy businesses."[7]

—Tao Gang, vice president of Sinovel, China's largest wind turbine producer. On Sept. 8, 2010, the Chinese State Council approved the Decision to Speed Up Cultivating and Developing Strategic Emerging Industries. It listed seven industrial sectors for policy support, including energy conservation and new energies.

CHINA ROARS AHEAD

China's continued ability to attract record levels of clean energy investment has made it the global clean energy superpower. The nation's ascendance has been steady and steep. In 2005, China attracted less than $3 billion worth of private investments in clean energy. In 2009, China led the world for the first time, with $39.1 billion invested. In 2010, investment in China's clean energy sector increased to a record $54.4 billion, 39 percent higher than 2009 levels. 2010 clean energy investments in China alone are equal to total global investments in 2004.

With aggressive clean energy targets and clear ambition to dominate clean energy manufacturing and power generation, China is rapidly moving ahead of the rest of the world. In 2010, it accounted for almost 50 percent of all manufacturing of solar modules and wind turbines. China's installation of less than 1 GW of solar energy capacity demonstrates that most of its production is for export markets. In contrast, 17 GW of wind energy was installed in China in 2010 helping the nation move quickly toward its 2020 target for installing 150 GW of wind. In fact, China accounted for 47 percent of all wind energy investments globally, with $45 billion tallied. Similarly, China led the world in asset financing, with $47.3 billion in private investments directed toward installation of clean energy generating capacity.

[7] Wu, Q, (2010). "Recharging China's clean energy dream.," Oct 2, 2010, http://news.xinhuanet.com/english2010/indepth/2010-10/02/c_13539987.htm

ROOFTOP SOLAR PROPELS GERMANY TO SECOND SPOT

Germany has had a long history of using feed-in tariffs to propel investments. In 2010, the prospect of reductions in its generous feed-in tariffs helped spur dramatic investment growth, propelling the country to second place among G-20 countries in 2010 from third place in 2009. Germany attracted twice as much clean energy investment in 2010 as in 2009, totaling $41.2 billion.

Clean energy investments in Germany were dominated by purchases of small-scale, rooftop solar energy projects. Eighty-eight percent of Germany's clean energy investments were in solar technology, and 83 percent of total investments were directed to small-scale projects. Germany accounted for 45 percent of total investment directed toward the solar sector among G-20 members and remains one of the largest producers of solar panels in the world.

Shutterstock / Philip Lange

THE UNITED STATES SLIPS AGAIN

Although clean energy investment increased 51 percent in 2010 to $34 billion, the United States fell to third place among G-20 members, one year after it lost top billing and slid to second place. Current-year investments in the United States are roughly equivalent to the $33 billion recorded in 2007.

For a variety of reasons, the United States' competitive position appears to be eroding. Stimulus funding that helped the clean energy industry recover from sharp recessionary declines will expire this year, and there is little indication of any significant policies or incentives to fill the gap in the near future. In fact, investors have noted ongoing uncertainty in United States. policy as a key reason that capital is sitting on the sidelines, or looking for certainty and opportunity abroad. Concerns include a lack of clarity on the direction of energy policy, uncertainty surrounding continuation of key financial incentives (e.g., production and investment tax credits), and disproportionate government supports for century-old fossil energy sources. These uncertainties for clean energy are reflected in the United States' subpar standing on a variety of key measures, including the five-year rate of investment growth and investment intensity.

The British Prime Minister's Office

"The key is to have incentives that last more than a year or two. It's hard for investors to commit with that kind of long-term uncertainty."

—Thomas Werner, CEO of SunPower, a U.S. maker of solar panels

The United States also has fallen to second place in installed clean energy capacity, behind China and just ahead of Germany. Although it is second in wind energy capacity globally, the United States installed 50 percent fewer gigawatts of wind power in 2010 than it did in 2009. Its installed solar power capacity ranks fifth in the world.

The United States continues to hold an overwhelming advantage in the area of venture capital/private equity investment, accounting for 73 percent of the G-20 total in 2010. The United States also attracted two-thirds of all G-20 investment in energy efficiency, in part because the nation's efficiency level trails that of European and other G-20 members.

Absent adoption of predictable, ambitious, long-term clean energy policies, the United States will have substantial difficulty keeping pace with China and other rapidly growing clean energy economies.

Shutterstock / Lisa F. Young

INVESTMENT GROWS IN INDIA

Clean energy investments in India increased 25 percent in 2010 to reach $4 billion. Although this level of investment is less than a 10th of China's world-leading level, India is now firmly entrenched as one of the top 10 countries for clean energy investment and has a bright future as a destination favorable to investors.

India is poised to take a leadership role in the solar sector, with a target of deploying 20 GW by 2020. In 2010, the country set about getting its National Solar Mission in place by permitting 0.5 GW worth of large solar thermal capacity and a modest 150 MW worth of photovoltaic (PV) solar. Once the modalities of the National Solar Mission are established, it is expected that investment in India's solar sector will accelerate significantly.

Shutterstock / atm2003

ITALY CLOSES IN ON GRID PARITY

In 2010, Italy had the G-20's third-highest increase in clean energy investment, which rose 124 percent to $13.9 billion, fourth among G-20 nations. As with Germany, favorable feed-in tariffs have helped spur additions of small-scale distributed clean energy capacity; Italy added 3 GW of solar energy, the overwhelming majority in small projects. Given the high cost of traditional electricity, Southern Italy is the first region in the world to achieve grid parity, or cost-competitiveness, for solar energy.

Shutterstock / Apple's Eyes Studio

DEBT CRISIS SQUEEZES SPANISH MARKET

The clean energy sector in Spain suffered as the nation embarked upon fiscal austerity measures to stave off concerns about sovereign debt levels. Once among the most rapidly growing clean energy economies, Spain fell to eighth place in 2010, from sixth place the year before. Clean energy investments in Spain declined 54 percent in 2010 to $4.9 billion as the national government reduced generous feed-in tariffs; credit was hard to come by; and investors looked for more promising markets.

Shutterstock / Quayside

UNITED KINGDOM INVESTMENT PLUMMETS

After achieving a fifth-place ranking for clean energy investments in 2009, the United Kingdom dropped out of the top 10 in 2010. Investment levels in 2009 were driven by large volume financings for offshore wind energy and the government's commitment to strong action on climate change. But 2010 brought a new government to Great Britain, and investors appear to believe that there is a high level of uncertainty about the direction of clean energy policymaking in the country.

Shutterstock / thieury

LATIN AMERICA POISED FOR GROWTH

Latin American countries appear ready for substantial clean energy growth in the coming years, especially in the wind sector, which Bloomberg New Energy Finance expects to increase fivefold by 2015. On a percentage basis, Latin America was home to the G-20 leaders in 2010 investment growth, Argentina and Mexico, which grew 568 percent and 273 percent, respectively. Clean energy growth in Latin America is driven by demand, the desire for energy independence as well as environmental and social concerns about reliance on large-scale hydroelectric projects. With considerable natural resources, the region also could experience significant growth in bioenergy. Already, Brazil and Argentina have substantial biofuels capacity.

Shutterstock / Pics-xl

FINANCING TYPES AND TRENDS

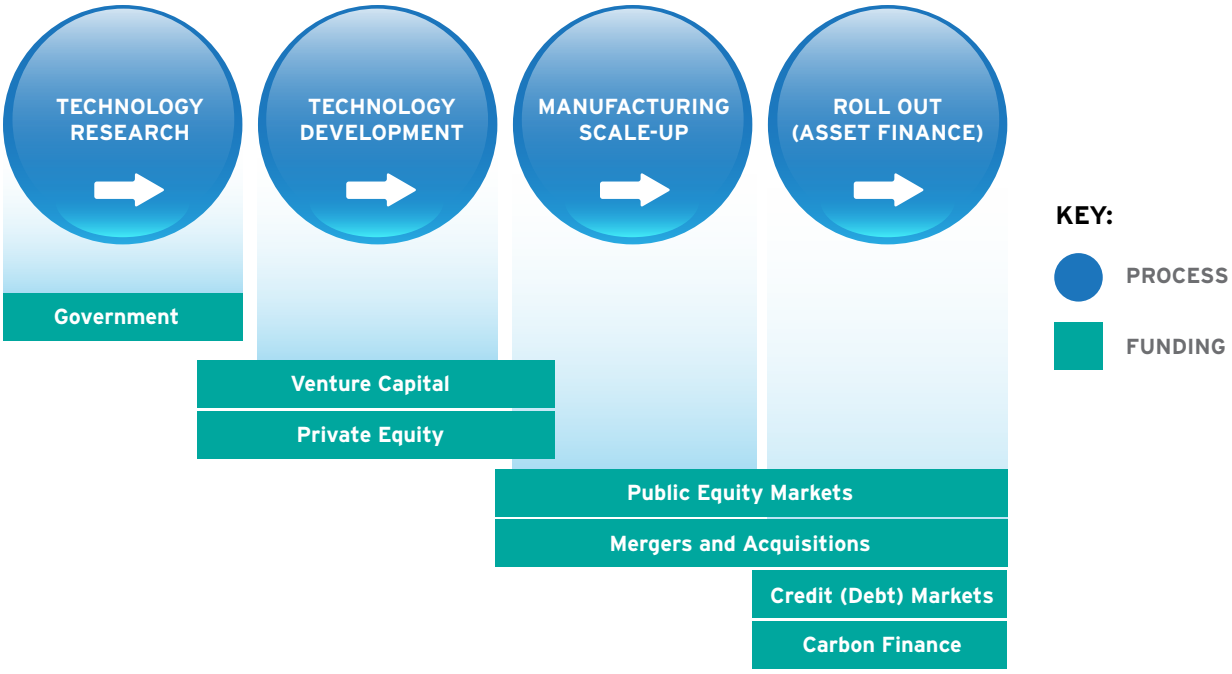
ABOUT THE INVESTMENT DATA

This report presents data on 2010 clean energy finance and investment in the G-20 nations. Public and private investments in research and development (R&D) totaling about $35 billion in 2010 are not included in the G-20 investment presentations. No data are presented for G-20 members Russia and Saudi Arabia because clean energy investment in these countries was negligible. Spain, a member of the EU but not an individual member of the G-20, is presented independently in this report in view of the size and relevance of its clean energy sector. For more details on the research methodology underlying this report, please see Appendix I.

Bloomberg New Energy Finance tracks thousands of transactions across the spectrum of clean energy finance, from R&D funding and venture capital invested in technology and early-stage companies, to the public market and asset financing used to finance business growth and clean energy deployment. The key investment categories are:

- ***Asset Financing:*** This category includes all money invested in renewable energy generation projects, whether from internal company balance sheets, debt finance or equity finance. The category excludes refinancing and short-term construction loans. Asset financing typically is associated with installation of clean energy equipment and generating capacity.
- ***Small-Scale Distributed Capacity:*** This category includes all money invested in residential scale solar projects of less than 1 MW.
- ***Public Markets:*** This category includes all money invested in the equity of publicly quoted companies developing renewable energy technology and clean power generation. Public market finance is typically associated with the scale-up phase, when companies are raising capital in public stock markets to finance product manufacturing and roll out. Investment in companies setting up generating capacity is included in the next category.
- ***Venture Capital/Private Equity:*** This category includes all money invested by venture capital funds in the equity of companies developing renewable energy technology. In general, venture capital is invested at the innovation stage, when companies are proving the market potential of goods and services.

FIGURE 15: THE SUSTAINABLE ENERGY FINANCING CONTINUUM



ASSET FINANCING

Asset financing, typically associated with the installation of clean energy equipment and generating capacity is a barometer of clean energy deployment and the creation of new jobs. It is the dominant class of clean energy finance.

After falling slightly in 2009, asset financing increased by 15 percent in 2010 (Figure 16). A total of $118 billion was invested in physical assets that generate clean energy (power, heat, fuels), with onshore wind being the dominant sector because of its relative maturity and scalability (Figure 17). Key observations include:

- Asset financing helped pay for the installation of more than 60 GW of new clean energy capacity in 2010.
- Wind energy was the preferred sector for asset financing in 2010, winning $85.4 billion. Solar energy attracted $17 billion in asset financing, while other renewables garnered $11.8 billion. Asset financing for biofuels was down 61 percent from 2009 levels to just $3.4 billion.
- China more than doubled its closest G-20 competitor for clean energy asset financing, attracting $47.3 billion. The United States was second at $21 billion, followed by Brazil at $6.9 billion and Germany at $6.2 billion.

FIGURE 16: G-20 ASSET FINANCE BY SECTOR, 2004-10 (BILLIONS OF $)

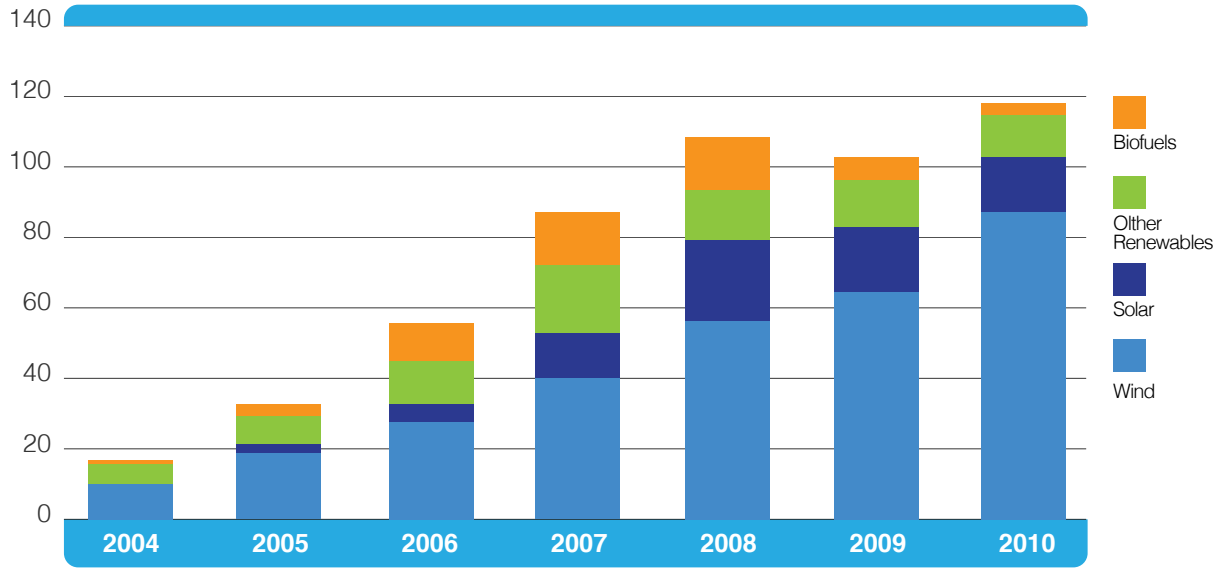
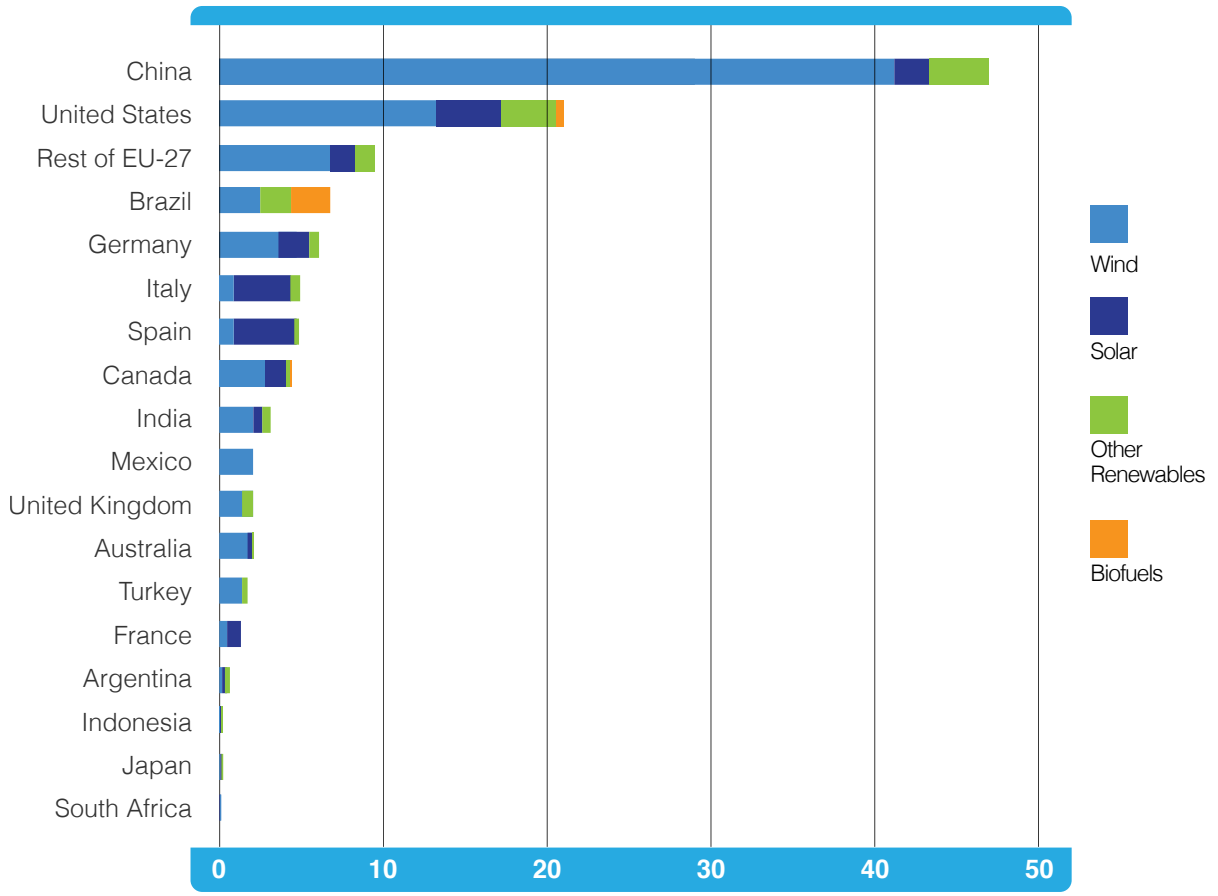


FIGURE 17: G-20 ASSET FINANCE BY SECTOR, 2010 (BILLIONS OF $)



SMALL DISTRIBUTED CAPACITY

Small distributed capacity is associated with residential-scale solar projects of less than 1 MW. Investment in small distributed capacity has been growing steadily since 2007 but increased dramatically in 2010. Highlights include:

- Overall, G-20 investments in small solar projects increased 100 percent in 2010 to $56.4 billion.
- In Germany, investment in small distributed capacity increased 132 percent to $34.3 billion, 61 percent of all G-20 investment in small projects.
- France experienced 150 percent growth in small project investments to $2.7 billion. Japan had 59 percent growth to $3.3 billion. Small project financing increased 49 percent in the United States to $4.5 billion.

FIGURE 18: G-20 SMALL DISTRIBUTED CAPACITY INVESTMENT 2004-10 (BILLIONS OF $)

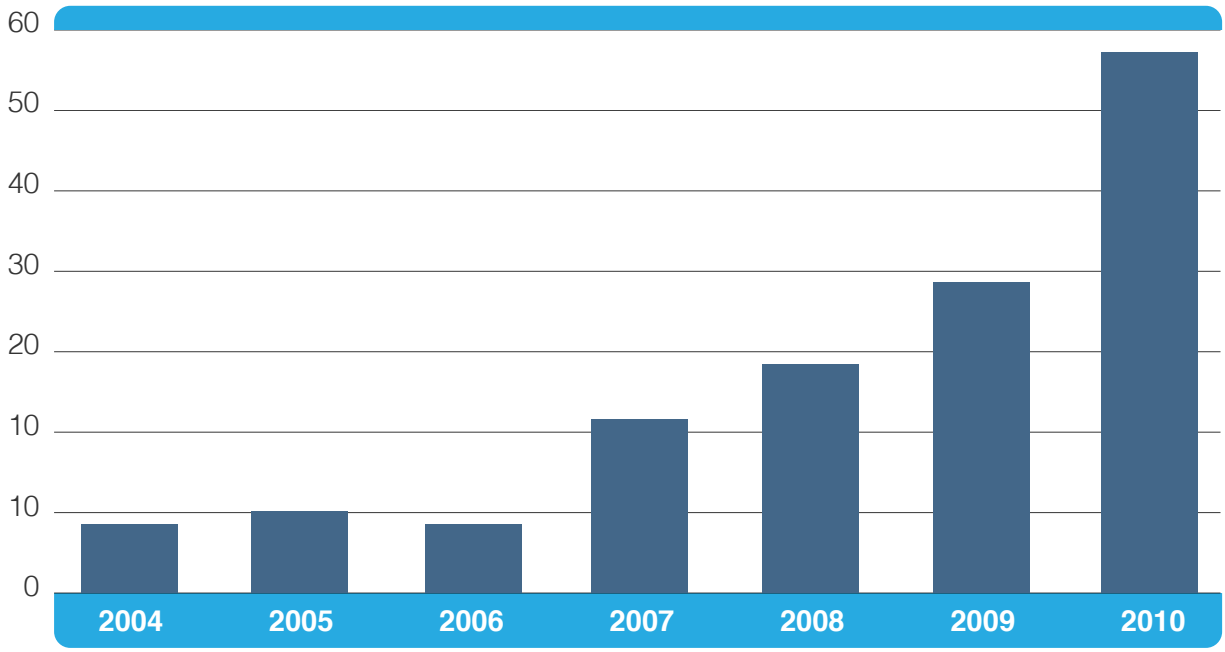
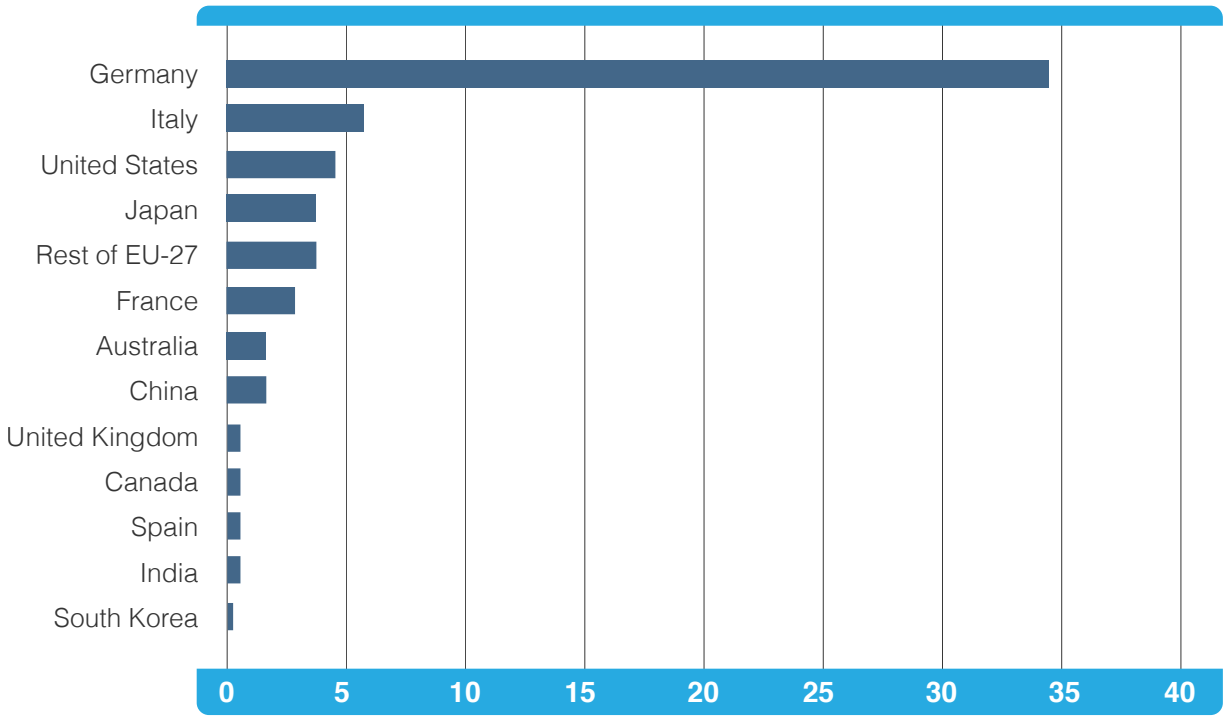


FIGURE 19: G-20 SMALL DISTRIBUTED CAPACITY INVESTMENT BY COUNTRY, 2010 (BILLIONS OF $)



PUBLIC MARKET FINANCING

Public market financing enables companies to raise capital for expansion and growth.

As the clean energy economy emerged in the mid-2000s, many clean energy companies used the stock markets to fund their growth plans. At its peak in 2007, public market funding reached $23.1 billion, but G-20 public offerings have not reached that level in the past three years. In 2010, public market financing totaled $15.9 billion, an increase of 27 percent over 2009 levels.

Key observations include:

- China dominated this financing category, attracting $5.9 billion, more than one-third of the G-20 total. Italy was second in this category, attracting $3.6 billion. The United States attracted $2.9 billion in public market financing.
- The wind energy sector was the dominant target for public market financing, attracting $8.2 billion, more than half the G-20 total. Solar energy attracted $3.9 billion.
- Clean energy valuations did not recover as strongly on the world's stock markets as did other sectors, making clean energy less attractive for companies to hold initial public offerings.

FIGURE 20: PUBLIC MARKET INVESTMENT BY SECTOR, 2004-10 (BILLIONS OF $)

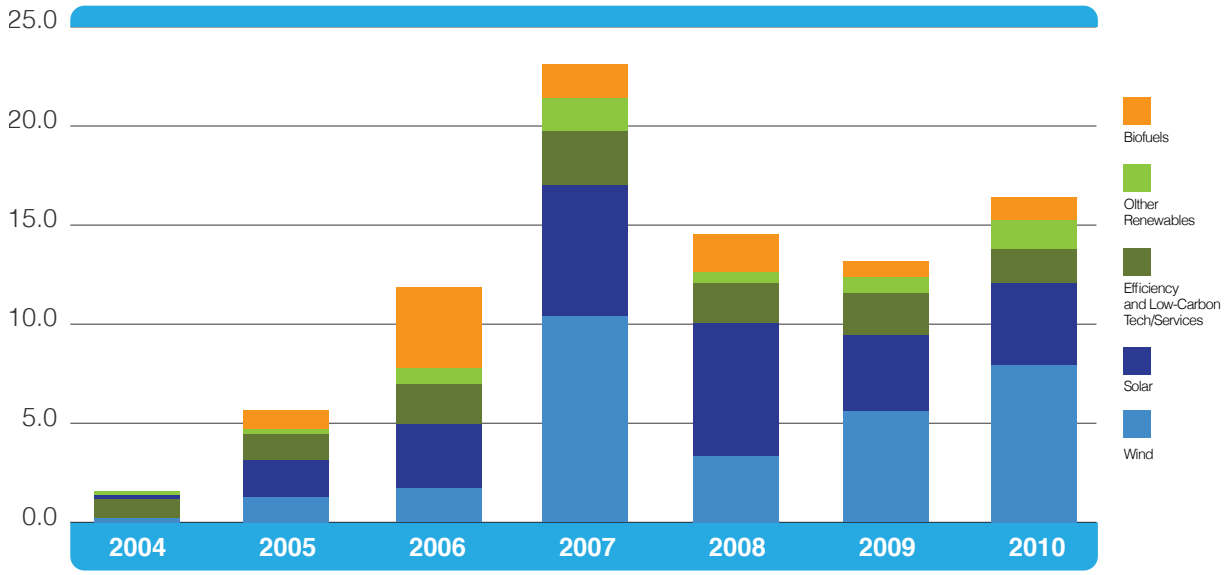
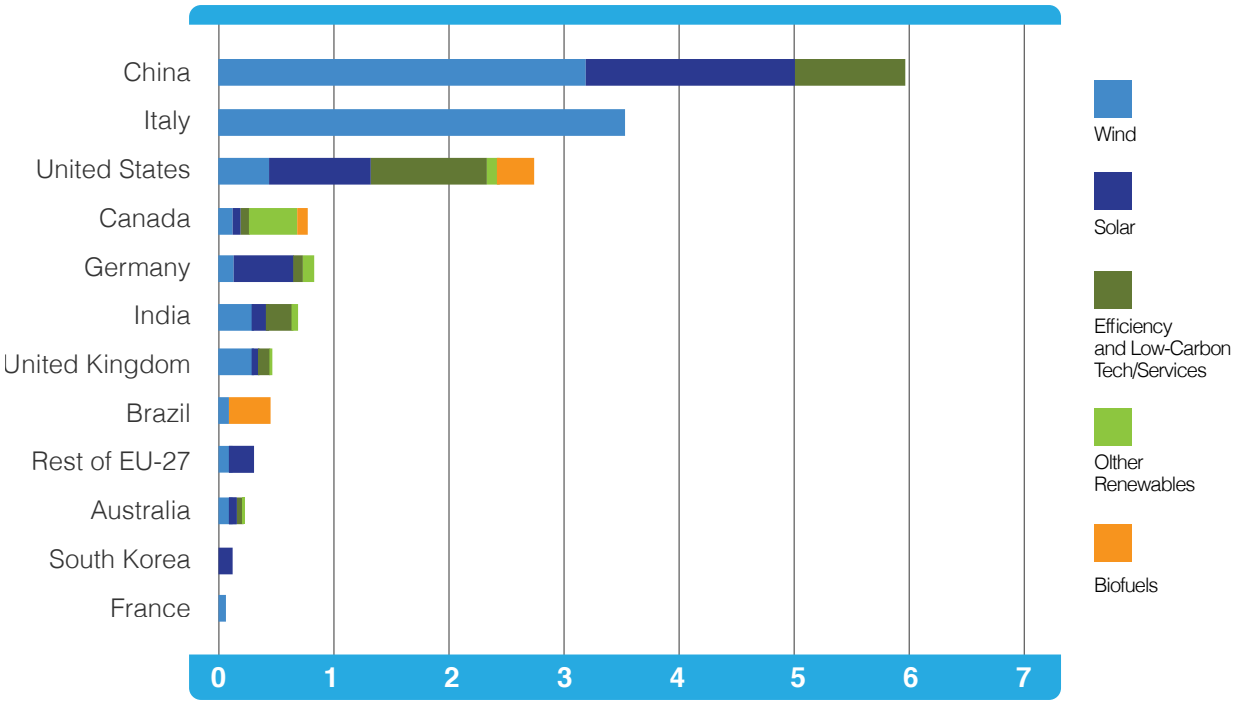


FIGURE 21: G-20 PUBLIC MARKET INVESTMENT BY SECTOR, 2010 (BILLIONS OF $)



VENTURE CAPITAL/PRIVATE EQUITY FINANCING

Venture capital and private equity financing are closely linked with technology innovation and development.

Although it accounts for only 4 percent of clean energy investment, venture capital is an important indicator of innovation and development of promising new clean energy technologies. Venture capital financing in 2010 rebounded from sharp declines the previous year to record a gain of 26 percent, for a total of $8.1 billion.

Key observations include:

- The United States remains the dominant leader in venture capital financing, accounting for $6 billion in 2010, three-quarters of the G-20 total. The United Kingdom and China are a distant second and third, with $367 million and $302 million, respectively, in venture capital investments.
- Energy efficiency was the leading beneficiary of venture capital and private equity investments, attracting $2.8 billion in 2010. Wind energy attracted $1.5 billion.

FIGURE 22: G-20 VENTURE CAPITAL/PRIVATE EQUITY FINANCING BY SECTOR, 2004-10 (BILLIONS OF $)

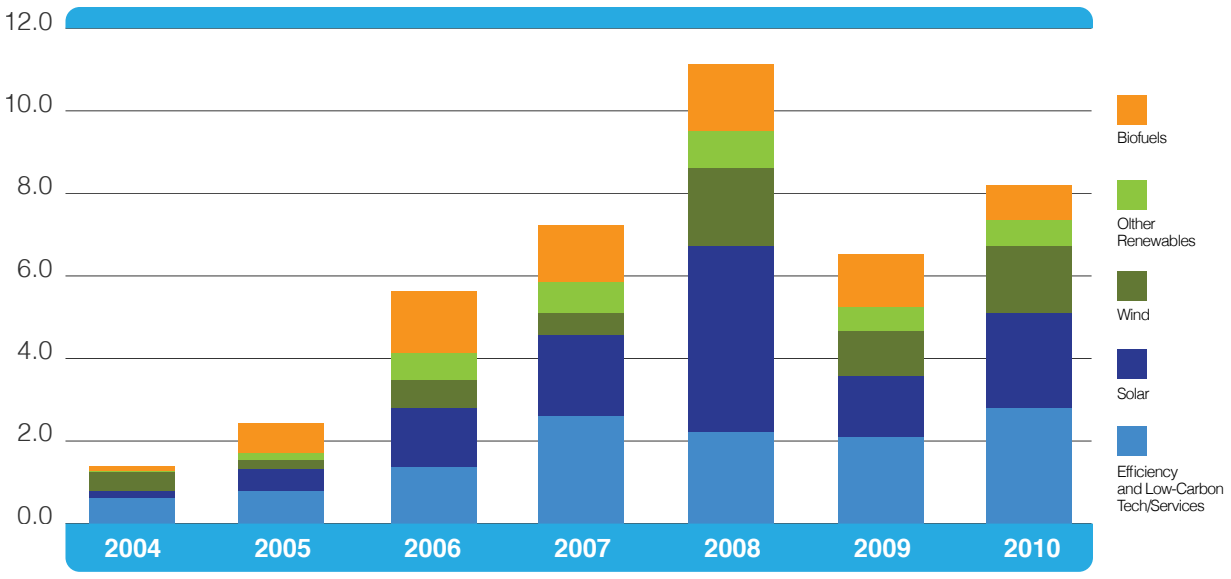
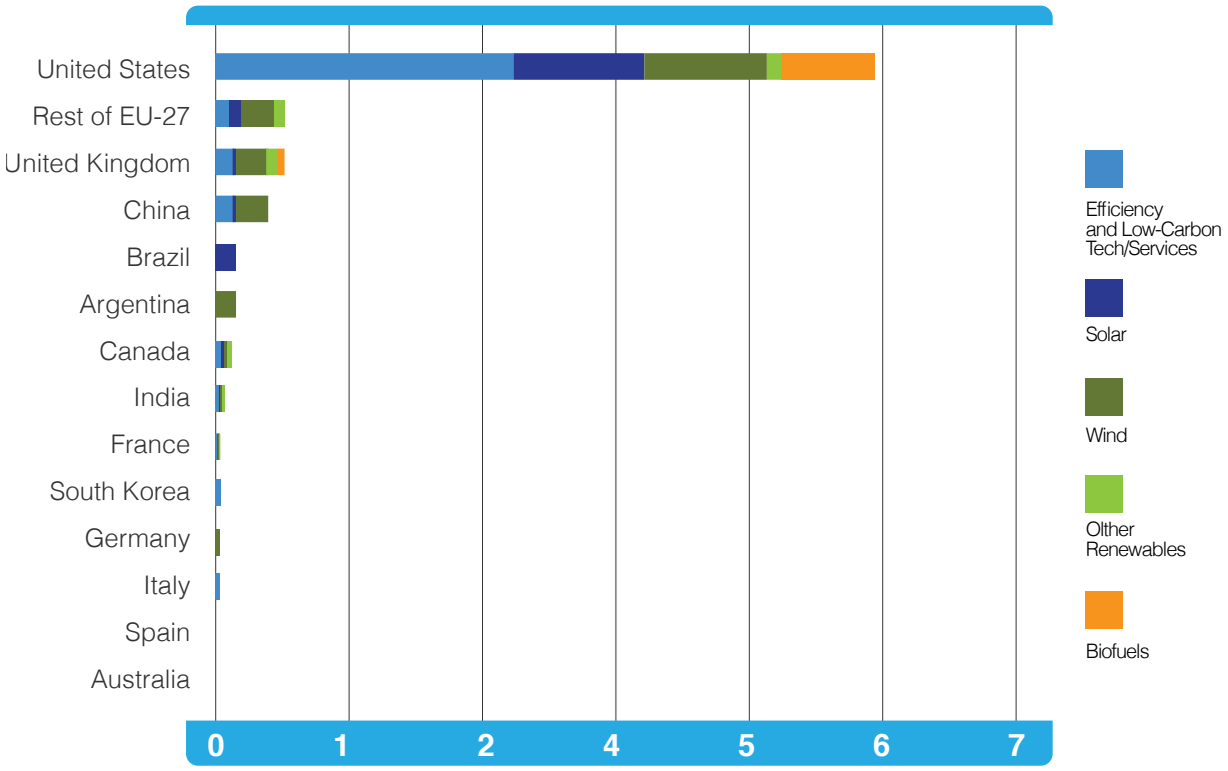


FIGURE 23: G-20 VENTURE CAPITAL/PRIVATE EQUITY FINANCING, 2010 (BILLIONS OF $)



INSTALLED RENEWABLE ENERGY CAPACITY

The total G-20 renewable energy capacity is 388 GW. Key observations include:

- China is now the world's leading location for installed clean energy capacity. China installed 17 GW of wind energy in 2010, raising total installed wind energy capacity to 43.4 GW.
- In the United States, wind energy installations declined to 5 GW, 50 percent less than in 2009, and now total 39 GW. The United States leads the world in only one category– installed geothermal energy capacity.
- Germany installed a world record 8 GW of solar energy generating capacity in 2010, solidifying its leadership position in installed solar, which now stands at 18 GW.

FIGURE 24: INSTALLED RENEWABLE ENERGY CAPACITY

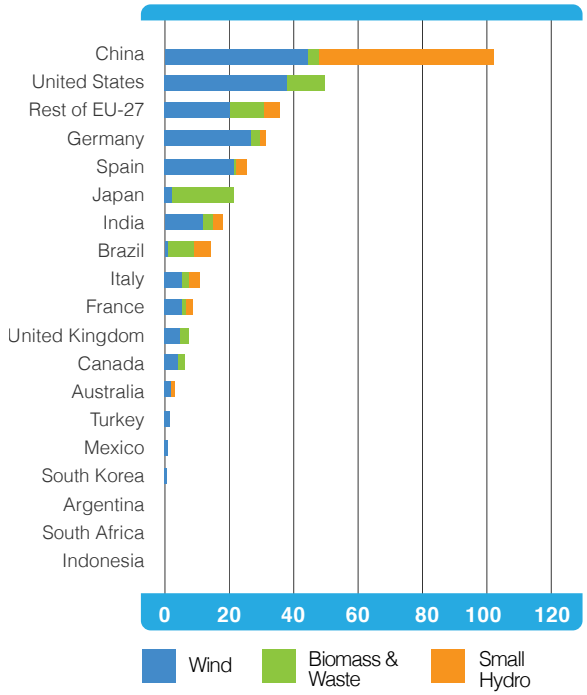
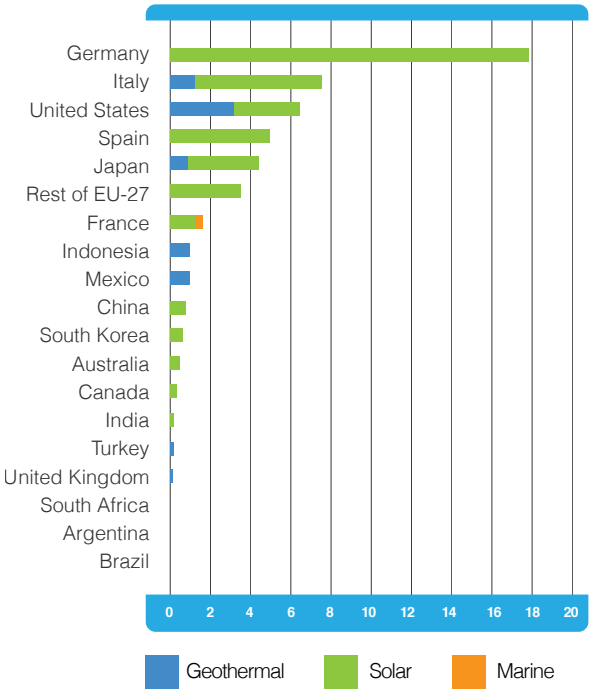


FIGURE 25: INSTALLED RENEWABLE ENERGY CAPACITY



G-20 STIMULUS FUNDING FOR CLEAN ENERGY

In response to the global economic crisis of 2008-09 and the long-term strategic significance of the clean energy sector, 12 members of the G-20 committed more than $194 billion for clean energy programs. By the end of 2010, $94.8 billion (49 percent) had been spent, including $74.5 billion in 2010. Bloomberg New Energy Finance tracks government stimulus funding separately from the private finance and investment figures presented throughout this report. Research and development funding is included in the total global investment numbers (which reached $243 billion in 2010), but stimulus funding for grants and incentives are not included.

Of the stimulus funds spent to date, 37 percent has been allocated for energy efficiency programs, 21 percent was awarded to renewable energy projects, 19 percent went for research and development, and 17 percent was put toward smart grid initiatives.

It is estimated that governments will spend another $69 billion in 2011, bringing total clean energy stimulus spending to 85 percent of total commitments, with the balance to be expended in 2012 and 2013.

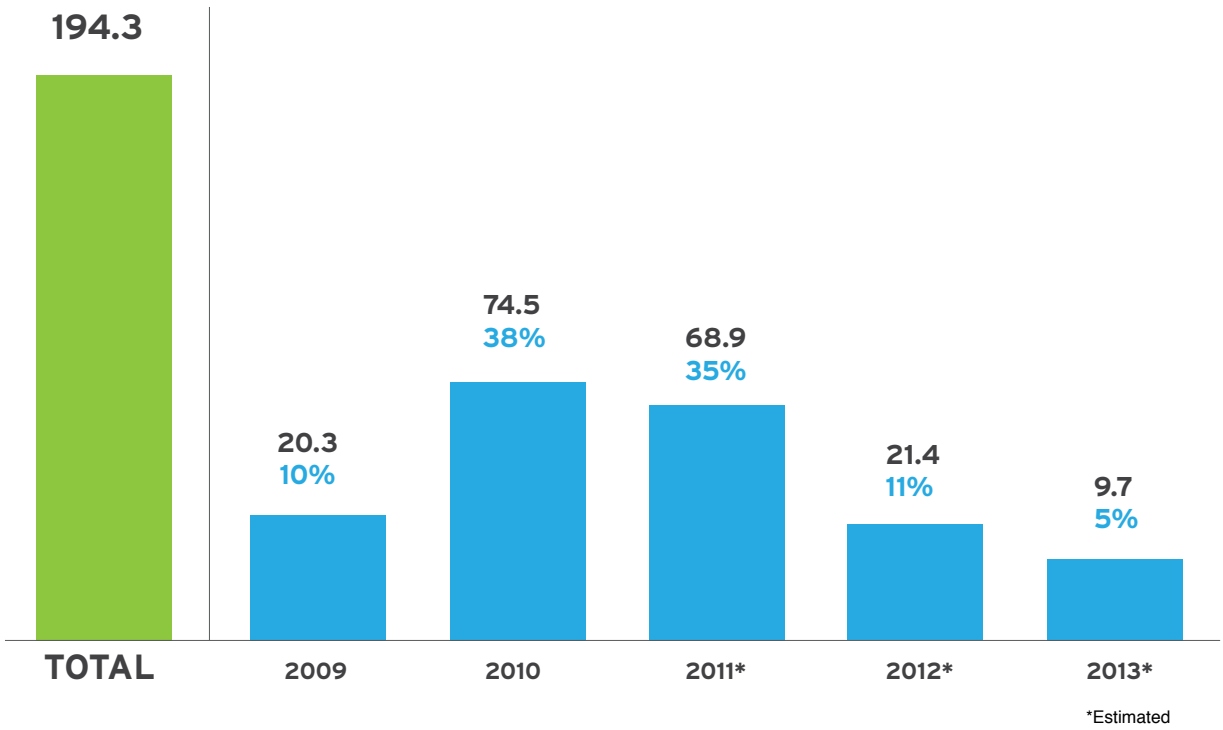
France has fully spent its clean energy stimulus funds and Japan has appropriated more than 85 percent. In dollar terms, China has spent the most, some $32 billion, followed by the United States with $23.2 billion spent.

FIGURE 26: CLEAN ENERGY STIMULUS FUNDS SPENT AND REMAINING, END OF 2010 (BILLIONS OF $)

Country	Total Announced	Total Spent	Total Remaining	Percent Spent
United States	65	23.2	41.8	36%
China	46.1	31.9	14.2	69%
South Korea	32.1	11.8	20.4	37%
Germany	15.2	8.9	6.3	59%
Rest of EU 27	11.1	4.2	6.9	38%
Japan	10.4	8.9	1.5	86%
Australia	3.7	1.6	2.1	44%
United Kingdom	3.4	1.1	2.3	34%
Brazil	2.5	0.2	2.3	7%
France	2.1	2.1	0	100%
Spain	1.7	0.6	1.1	36%
Canada	0.8	0.13	0.65	17%
Total	**194.3**	**94.8**	**99.5**	**49%**

Source: Bloomberg New Energy Finance

FIGURE 27: ANNUAL STIMULUS FUNDING FOR CLEAN ENERGY PROGRAMS (BILLIONS OF $)



APPENDIX I: LIST OF FIGURES

APPENDIX II: METHODOLOGY

All figures in this report, unless otherwise credited, are based on the output of the Desktop database and analysis by sector experts of Bloomberg New Energy Finance, an online portal to the world's most comprehensive database of investors, projects and transactions in clean energy. Data are current as of the end of 2010 and are categorized by country. Members of the EU not profiled individually here are aggregated as the "Rest of the EU."[8]

The Bloomberg New Energy Finance Desktop collates all organizations, projects and investments according to transaction type, sector, geography and timing. It covers 20,000 transactions, 24,000 projects and 38,000 organizations, including start-ups, corporations, venture capital and private equity providers, banks and other investors.

Research included the following renewable energy projects: all biomass, geothermal and wind generation projects of more than 1 MW, all hydro projects between 0.5 and 50 MW, all commercial solar projects of more than 0.3 MW, all marine energy projects, and all biofuel projects with a capacity of 1 million liters or more per year.

Annual investment in small-scale and residential projects of less than 1 MW is tracked separately by Bloomberg New Energy Finance.

Energy efficiency investment includes financial investment in technology companies plus corporate and government investment in R&D. It excludes investment in energy efficiency projects by governments and public financing institutions. Where deal values are not disclosed, Bloomberg New Energy Finance assigned an estimated value based on comparable transactions. Deal values are rigorously rechecked and updated when further information is released about particular companies and projects. The statistics used are historic figures, based on confirmed and disclosed investment.

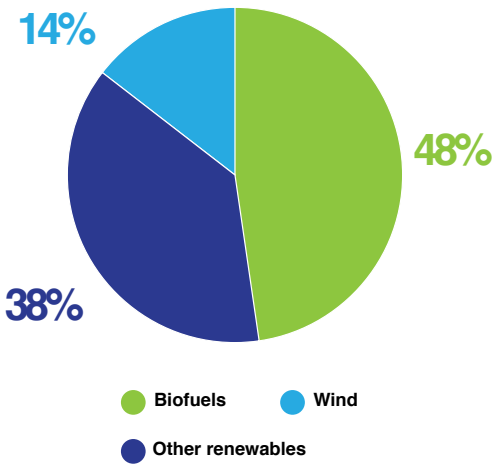
Bloomberg New Energy Finance continuously monitors investment in renewable energy and energy efficiency. This is a dynamic process. As the sector's visibility grows, information flow improves. New deals come to light and existing data are refined, meaning that historical figures are constantly updated.

[8] The "Rest of the EU" category includes Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia and Sweden.

ARGENTINA

Argentina attracted $743 million in clean energy investment in 2010. While the value of clean energy investment ranks 16th among G-20 members, Argentina has experienced significant growth in recent years, and led the G-20 in 2010 with 570 percent growth over the last year. Argentina's 115 percent growth rate over the past five years places it 2nd among the G-20. The country's policy framework is aimed primarily at displacing oil through development of biofuels, which attracted 22 percent of 2010 clean energy investment. Wind investments increased significantly in 2010, accounting for 62 percent of the total. Argentina's potential for wind and biomass energy sources positions it well for future growth in clean power capacity.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)

Total Investment	$743 million
G-20 Investment Rank	16
Percentage of G-20 Total	0.3%
5-Year Growth Rate	115%

Installed Clean Energy (2010)

Total Installed Renewable Energy	0.6 GW
Percentage of G-20 Total	0.1%
5-Year Growth Rate	2%
Key Renewable Energy Sectors	
Wind	55 MW
Small-Hydro	436 MW

Key Clean Energy Targets (2012)

Renewable Energy	8% of total power generation (by 2016)
Ethanol	5% of total gasoline consumption
Biodiesel	7% of total diesel consumption

Key Investment Incentives

Wind, Solar, Biomass, Small-Hydro	Production tax credits (PTC)
Biofuel	Tax exemption for producers and guaranteed fixed prices set by government

National Clean Energy Policies

✔ Carbon Cap	✔ Auto Efficiency Standards
Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	Government Procurement
✔ Clean Energy Tax Incentives	✔ Green Bonds

AUSTRALIA

Australia's 2010 clean energy investments increased sharply to $3.3 billion, placing it 12th among G-20 members. Investment in the sector increased 104 percent, fueled by more than $1 billion worth of investment in new solar capacity. Australia has a diverse clean energy portfolio, led by the wind sector, which attracted 57 percent of clean energy investment in 2010. The solar sector accounted for 34 percent of 2010 investments. Australia seeks to increase installed wind energy generating capacity to 4 GW over the next four years.

Finance and Investment (2010)

Total Investment	$3.3 billion
G-20 Investment Rank	12
Percentage of G-20 Total	1.6%
5-Year Growth Rate	42.5%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	4 GW
Percentage of G-20 Total	0.8%
5-Year Growth Rate	18%
Key Renewable Energy Sectors	
Wind	2,000 MW
Biomass	741 MW

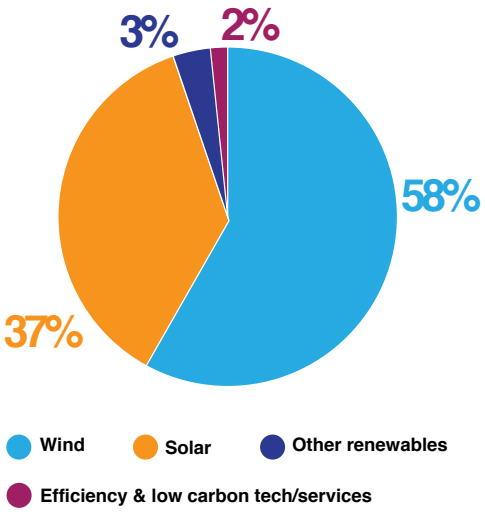
Key Clean Energy Targets (2020)

Renewable energy accounts for 20% of electricity demand by 2020

Key Investment Incentives

Solar	Feed-in tariffs
All Renewable Energy	Green Certificates

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



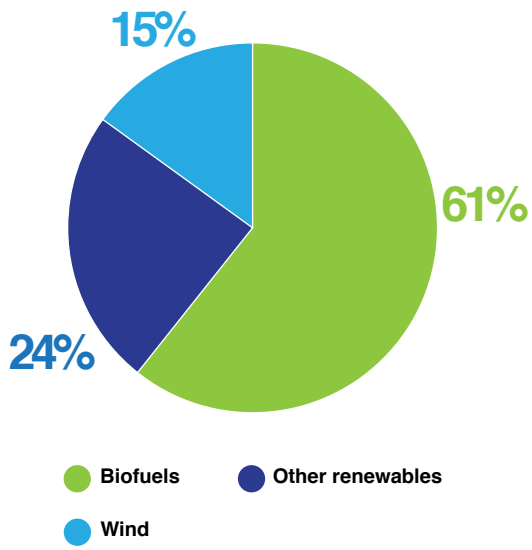
National Clean Energy Policies

	Carbon Cap		Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard		Government Procurement
	Clean Energy Tax Incentives		Green Bonds

BRAZIL

Brazil is sixth among G-20 members for investments in clean energy and second only to China among emerging economies. Brazil's total clean energy investment in 2010 was $7.6 billion, with 40 percent invested in biofuels, 31 percent in wind, and 28 percent in other renewable energy sources. Brazil also places sixth among the G-20 for five-year rate of investment growth, which stands at 81 percent. Brazil is also among the top 10 countries for amount of GDP invested in clean energy. With almost 14 GW, Brazil has the world's seventh largest installed clean energy capacity to complement its significant biofuels capacity.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)	
Total Investment	$7.6 billion
G-20 Investment Rank	6
Percentage of G-20 Total	3.9%
5-Year Growth Rate	81%

Installed Clean Energy (2010)	
Total Renewable Energy Capacity	14 GW
Percentage of G-20 Total	4%
5-Year Growth Rate	42%
Key Renewable Energy Sectors	
Ethanol (liters)	36 billion
Biomass	8,000 MW
Small-Hydro	5,000 MW

Key Clean Energy Targets (2012)	
Wind	1,805 MW
Biodiesel	5% of total diesel consumption

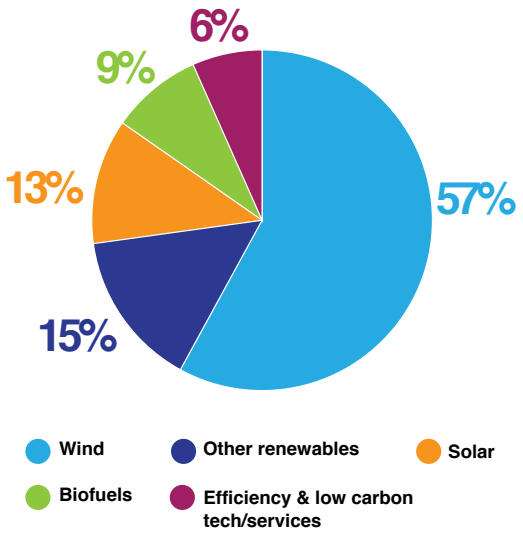
Key Investment Incentives	
Wind	Generation-based subsidies/ preferential loans
Small-Hydro	Generation-based subsidies/ preferential loans
Biomass	Generation-based subsidies/ preferential loans

National Clean Energy Policies	
Carbon Cap	✔ Auto Efficiency Standards
Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

CANADA

Canada realized $5.6 billion invested in its clean energy sector in 2010, a 61 percent annual increase and ranking 7th place among G-20 members. Fifty-two percent of 2010 clean energy investment was directed to the wind sector, with solar attracting 24 percent. Canada has 7.6 GW of renewable energy, placing it in the 12th spot among G-20 members. Canada is 4th in the world for dollars of GDP invested in clean energy. Wind and small-hydro are the leading clean energy sectors and benefit from strong support from provincial governments, which play a much more significant role in energy policymaking than the national government.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)

Total Investment	$5.6 billion
G-20 Investment Rank	7
Percentage of G-20 Total	2.8%
5-Year Growth Rate	52%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	7.4 GW
Percentage of G-20 Total	1.6%
5-Year Growth Rate	16%
Key Renewable Energy Sectors	
Wind	4,150 MW
Biomass	1,750 MW

Key Clean Energy Targets (2020)

Renewable Energy (Ontario)	Obtain 13% of power supply from renewable energy by 2018
Economy-wide	17% reduction from 2005 greenhouse gas levels by 2020

Key Investment Incentives*

Wind, Solar, Biomass	Generation based subsidies/preferential loans

*Incentives primarily through provincial governments

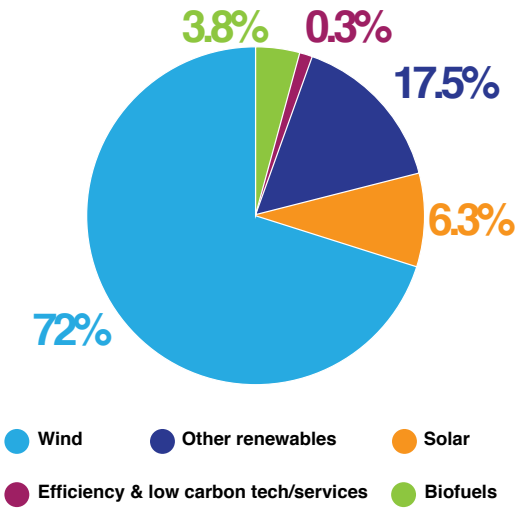
National Clean Energy Policies

Carbon Cap	✔ Auto Efficiency Standards
Carbon Market	Feed-in Tariffs
Renewable Energy Standard	Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

CHINA

China continued its seemingly inexorable growth in clean energy investment, growing 39 percent in 2010 to attract a world-record $54.4 billion. In 2009, China surpassed the United States as the number one nation for installed clean energy capacity, further solidifying its position as the world's clean energy powerhouse. With a staggering $45 billion invested in wind, China was able to drive installation of 17 GW of additional wind energy generating capacity. Another $4.7 billion was invested in the solar sector, as China begins reaching for its new goal of 20 GW of installed solar energy by 2020. It also has a target of installing 150 GW of wind power by 2020. China has also established itself as the world's leading clean energy manufacturer, producing almost 50 percent of all wind turbine and solar module shipments.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)	
Total Investment	$54.4 billion
G-20 Investment Rank	1
Percentage of G-20 Total	27.5%
5-Year Growth Rate	88%

Installed Clean Energy (2010)	
Total Renewable Energy Capacity	103 GW
Percentage of G-20 Total	27%
5-Year Growth Rate	106%
Key Renewable Energy Sectors	
Wind	43,410 MW
Small-Hydro	56,000 MW
Solar PV	800 MW

Key Clean Energy Targets (2020)	
Wind	150,000 MW
Biomass	30,000 MW
Solar	20,000 MW

Key Investment Incentives	
Wind	Fixed feed-in tariff
Renewable Energy	Renewable energy standard & guaranteed purchase by utilities
Solar	Rooftop and building integrated photovoltaic subsidies

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

FRANCE

In 2010, France saw clean energy investments increase 26 percent over 2009 to reach $4 billion, allowing the country to break the ranks of the G-20's top-10 countries for investment at 9th place. France's strong growth was driven by a surge in small-scale solar energy projects, which increased by 150 percent. Solar investments accounted for $3.6 billion, or 90 percent, of all clean energy investments in France. The rapid pace of increased investment in solar projects was spurred by aggressive feed-in tariffs, which the government slowed toward the end of the year.

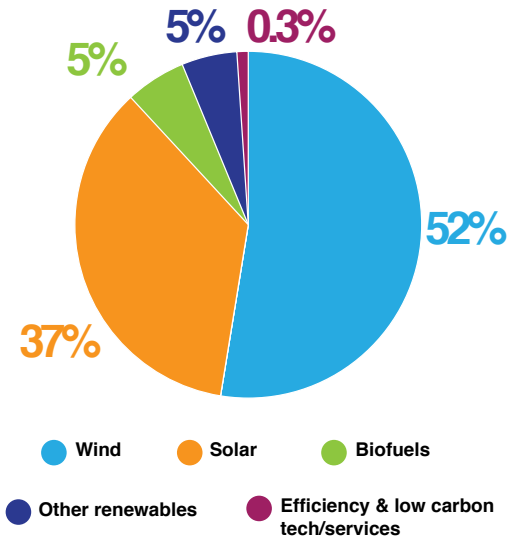
Finance and Investment (2010)	
Total Investment	$4 billion
G-20 Investment Rank	9
Percentage of G-20 Total	2%
5-Year Growth Rate	56%

Installed Clean Energy (2010)	
Total Renewable Energy Capacity	9.6 GW
Percentage of G-20 Total	2.5%
5-Year Growth Rate	42%
Key Renewable Energy Sectors	
Wind	5,400 MW
Small-Hydro	2,000 MW
Solar PV	1,230 MW

Key Clean Energy Targets	
Renewable Energy	23% of total energy consumption
Transportation	Renewables to be 10% of total fuel consumption

Key Investment Incentives	
All Renewable Energy	Feed-in tariffs
RE Equipment	Reduced value added tax

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)

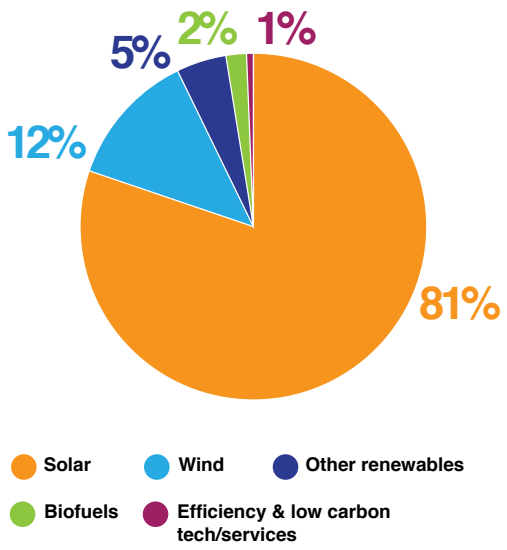


National Clean Energy Policies			
	Carbon Cap		Auto Efficiency Standards
✔	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

GERMANY

Clean energy investments in Germany increased by 100 percent in 2010, to $41.2 billion, surpassing the United States and ranking 2nd in the G-20. Germany's dramatic growth was led by a sharp increase in deployment of small-scale solar projects, which increased 132 percent to enable an estimated 8 to 9 GW of new solar capacity to be installed. Eighty-eight percent of 2010 clean energy investment in Germany was directed to the solar sector, some $36.1 billion. Another $4.7 billion was invested to increase Germany's considerable wind assets. Germany leads all nations in clean energy investment intensity.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)

Total Investment	$41.2 billion
G-20 Investment Rank	2
Percentage of G-20 Total	21%
5-Year Growth Rate	47.4%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	49 GW
Percentage of G-20 Total	13%
5-Year Growth Rate	67%
Key Renewable Energy Sectors	
Wind	27,340 MW
Solar	17,790 MW
Biomass	2,320 MW

Key Clean Energy Targets (2030)

RE Heat	Procure 14% of heating resource from renewable energy
Renewable Energy	18% of total consumption

Key Investment Incentives

Wind, Solar, Biomass	Feed-in tariffs

National Clean Energy Policies

Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

INDIA

India is ranked tenth among G-20 members and constitutes two percent of total G-20 investment. In 2010, clean energy investment in India increased 25 percent to $4 billion. Sixty-three percent of 2010 clean energy investment was in the wind sector, with 17 percent invested in solar. India aims to acquire a massive 20 GW of solar by 2020, and the country has worked out implementation of key "Solar Mission" programs. In 2011, India is likely to see increased investment in solar. India now has the 7th greatest amount of installed clean energy capacity in the world at 18.7 GW.

Finance and Investment (2010)

Total Investment	$4 billion
G-20 Investment Rank	10
Percentage of G-20 Total	2.0%
5-Year Growth Rate	43%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	18.7 GW
Percentage of G-20 Total	5%
5-Year Growth Rate	31%
Key Renewable Energy Sectors	
Wind	13,260 MW
Small-Hydro	2,939 MW

Key Clean Energy Targets (2012)

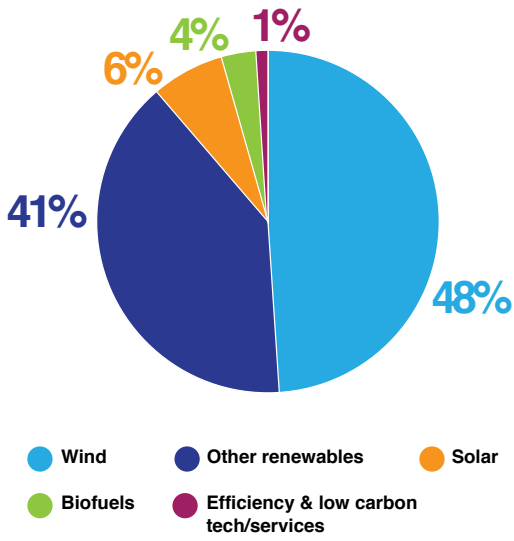
Wind	16,230 MW
Solar	1,100 MW
Biomass	2,877 MW

Key Investment Incentives*

Wind, Solar	Feed-in tariffs
Small-Hydro, Biomass	Accelerated depreciation of 80% in year one
Renewable Energy Projects	Preferential tax rate of 15% instead of the standard 30%

*Incentives primarily through provincial investments

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



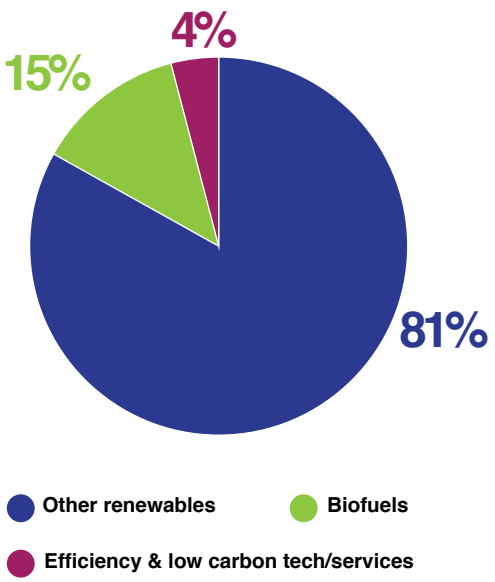
National Clean Energy Policies

	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

INDONESIA

Investment in Indonesia's clean energy sector declined 55 percent in 2010. The country's $247 million in clean energy investments ranks it 18th among G-20 members. Almost all clean energy investment in Indonesia has been directed to geothermal energy, of which Indonesia has installed 1.19 GW, 2nd among G-20 members. Over the past five years, Indonesia's rate of growth in clean energy investments places it 4th among G-20 countries, but it is building from a significantly lower base than others.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)

Total Investment	$247 million
G-20 Investment Rank	18
Percentage of G-20 Total	0.1%
5-Year Growth Rate	89%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	1 GW
Percentage of G-20 Total	0.3%
5-Year Growth Rate	7%
Key Renewable Energy Sectors	
Geothermal	1,000 MW

Key Clean Energy Targets (2025)

Geothermal	9,500 MW
Renewable Energy Power	15% of all electricity to be sourced from clean energy

Key Clean Energy Incentives

Geothermal	Preferential tariffs, no import duties
Renewable Energy Power	Guaranteed purchase of renewable power by state utilities

National Clean Energy Policies

Carbon Cap	Auto Efficiency Standards
Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

ITALY

Italy saw 124 percent growth in clean energy investments in 2010, the 3rd highest among G-20 members. With almost $14 billion invested, Italy rose up the ranks of G-20 members to take the 4th position. Sixty-two percent ($8.6 billion) of 2010 clean energy investments were directed toward small scale solar projects. Italy also attracted a healthy $4.5 billion in wind energy investments. With high conventional energy prices and abundant solar resources, Italy is the first country in which solar power has achieved price parity with other electric sources.

Finance and Investment (2010)

Total Investment	$13.9 billion
G-20 Investment Rank	4
Percentage of G-20 Total	7%
5-Year Growth Rate	71%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	16.7 GW
Percentage of G-20 Total	4.0%
5-Year Growth Rate	45%
Key Renewable Energy Sectors	
Wind	5,890 MW
Solar	6,520 MW
Small-Hydro	2,540 MW

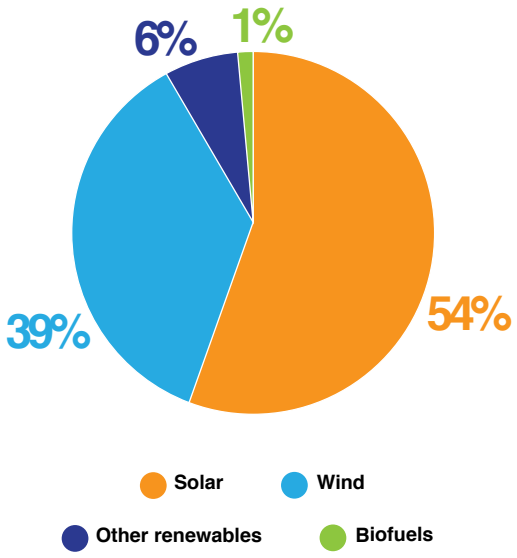
Key Clean Energy Targets (2020)

Renewable Energy	17% of final energy consumption
Transportation	Renewable energy 10% of final transportation energy consumption

Key Investment Incentives

Solar, Biomass, Hydro	Feed-in tariffs
Large-scale Renewable Energy	Green certificates
Small Wind and Solar Projects	10% reduction on value added Tax

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



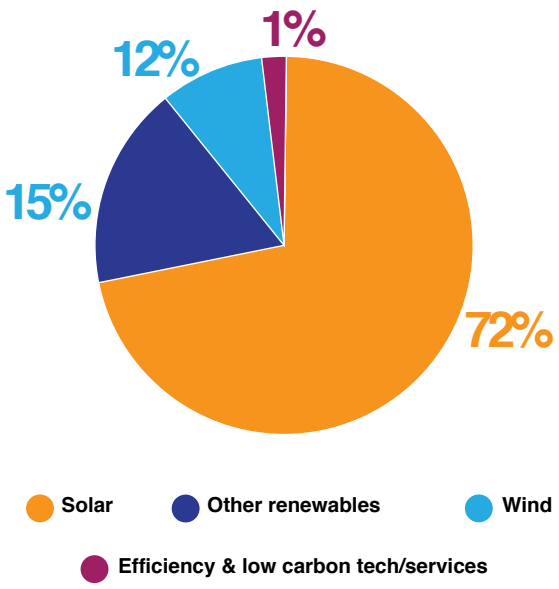
National Clean Energy Policies

Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

JAPAN

Clean energy investment in Japan increased a modest 10 percent to $3.3 billion in 2010, placing it 11th among G-20 members. Japan's five-year growth rate in clean energy investments ranks last in the G-20. Japan's clean energy sector is dominated by solar, which received 96 percent of the nation's clean energy investments. Japan has almost 20 gigawatts of installed biomass energy, and its steady adoption of solar energy has resulted in 3.5 GW of installed capacity. Japan has set ambitious targets to source 28 GW from solar and 5 GW from wind by 2020. Active pursuit of these goals would make it one of the G-20's most promising growth markets.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)	
Total Investment	$3.5 billion
G-20 Investment Rank	11
Percentage of G-20 Total	0.2%
5-Year Growth Rate	25%

Installed Clean Energy (2010)	
Total Renewable Energy Capacity	26 GW
Percentage of G-20 Total	7%
5-Year Growth Rate	45%
Key Renewable Energy Sectors	
Biomass	19,530 MW
Solar	3,610 MW

Key Clean Energy Targets (2020)	
Wind	5,000 MW
Solar	28,000 MW

Key Investment Incentives	
Solar	PV power buy-back program, residential installation subsidy
Energy Efficiency	Domestic CDM program

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard		Government Procurement
	Clean Energy Tax Incentives		Green Bonds

MEXICO

Mexico attracted $2.3 billion in clean energy investments in 2010, placing it 14th among the G-20 members. Mexico's 273 percent growth in 2010 was the second highest among G-20 members. Existing renewable power capacity is primarily for supply to remote areas with an unstable grid. Almost all 2010 investments were directed toward the wind sector, which is approaching 1 GW in installed capacity.

Finance and Investment (2010)

Total Investment	$2.3 billion
G-20 Investment Rank	14
Percentage of G-20 Total	1.1%
5-Year Growth Rate	74%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	2.33 GW
Percentage of G-20 Total	0.4%
5-Year Growth Rate	12%
Key Renewable Energy Sectors	
Geothermal	960 MW
Wind	880 MW

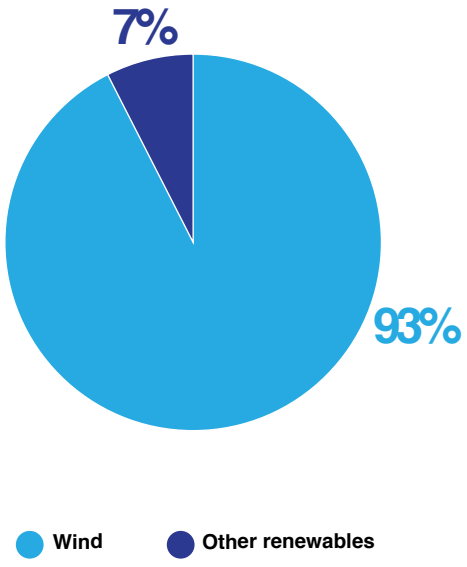
Key Clean Energy Targets (2024)

Renewable Energy	35% of total electricity production by 2024

Key Investment Incentives

Wind	Generation-based subsidies
Geothermal	Generation-based subsidies
Biomass	Generation-based subsidies
Renewable Energy	50-70% discount on power transmission through renewable energy plants with capacity of 500 KW.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



National Clean Energy Policies

	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

SPAIN*

Spain, although not an individual member, is associated with the G-20 through its membership in the European Union. It is profiled in this report separately in view of its historic leadership in clean energy. Investment declined 54 percent in 2010, however, as the nation addressed fiscal imbalances and rolled back feed-in tariffs. Still, Spain attracted $4.9 billion in clean energy investments, the eighth highest level in the G-20. Eighty-six percent of clean energy investments went to the solar sector in 2010. Ongoing policy uncertainties are likely depressing clean energy investment in Spain for the foreseeable future.

Finance and Investment (2010)

Total Investment	$4.9 billion
G-20 Investment Rank	8
Percentage of G-20 Total	2.5%
5-Year Growth Rate	55%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	27.8 GW
Percentage of G-20 Total	7%
5-Year Growth Rate	39%
Key Renewable Energy Sectors	
Wind	20,720 MW
Solar	4,710 MW
Small Hydro	1,870 MW

Key Clean Energy Targets (2011)

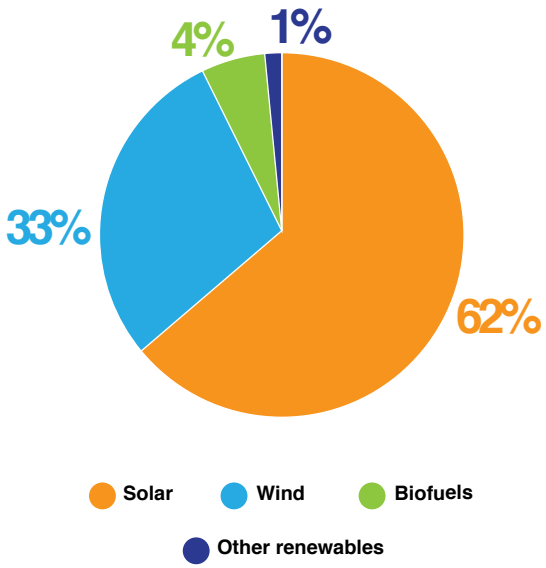
Renewable Energy	20% of total energy consumption
Biofuels	10% of total fuel consumption

Key Investment Incentives

Wind, Solar, Biomass	Feed-in tariffs
Renewable Energy Equipment	Business tax deduction

*Spain is not a G-20 member, but it is an important clean energy player within the EU.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



National Clean Energy Policies

	Carbon Cap		Auto Efficiency Standards
✔	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

SOUTH KOREA

South Korea's investments declined 58 percent in 2010 to $356 million, placing it 17th among G-20 members. Eighty-two percent of 2010 clean energy investments were in the solar sector. The nation also has ambitions to become a supplier of wind turbines. South Korea has 660 MW solar and 330 MW of wind and aims to have 3 GW of installed clean energy capacity by the end of 2011. South Korea's $32.2 billion clean energy stimulus package is one of the G-20's most generous.

Finance and Investment (2010)

Total Investment	$356 million
G-20 Investment Rank	17
Percentage of G-20 Total	0.17%
5-Year Growth Rate	62%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	1.2 GW
Percentage of G-20 Total	0.3%
5-Year Growth Rate	88%
Key Renewable Energy Sectors	
Solar	660 MW
Wind	330 MW

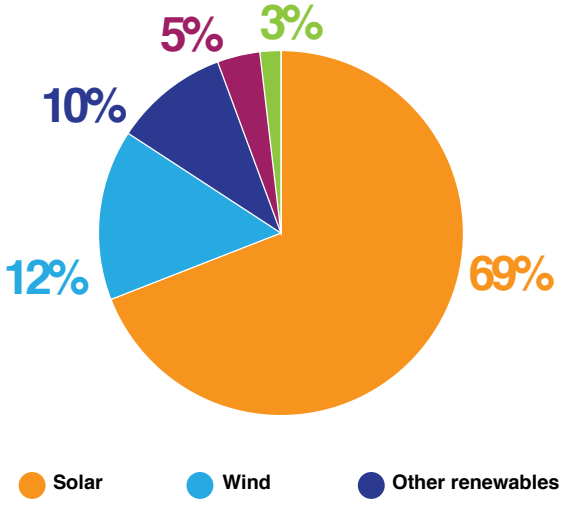
Key Clean Energy Targets (2024)

Wind	9,000 MW
Solar	4,200 MW

Key Investment Incentives

Renewable Energy	Feed-in Tariffs, tax exemption for dividends
RE Manufacturing	Long-term loan for manufacturing facilities

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



National Clean Energy Policies

	Carbon Cap	✔	Auto Efficiency Standards
✔	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

TURKEY

Turkey's five-year investment growth rate is the highest in the G-20, but its clean energy economy remains small. Its 2010 investment of $1.2 billion was 22 percent below 2009 levels and placed it 15th among G-20 members. Ninety-one percent of 2010 investment was in the wind sector, the leading clean energy source in Turkey.

Finance and Investment (2010)

Total Investment	$1.2 billion
G-20 Investment Rank	15
Percentage of G-20 Total	0.6%
5-Year Growth Rate	115%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	1.42 GW
Percentage of G-20 Total	0.3%
5-Year Growth Rate	85%
Key Renewable Energy Sectors	
Small-Hydro	110 MW
Wind	1,200 MW

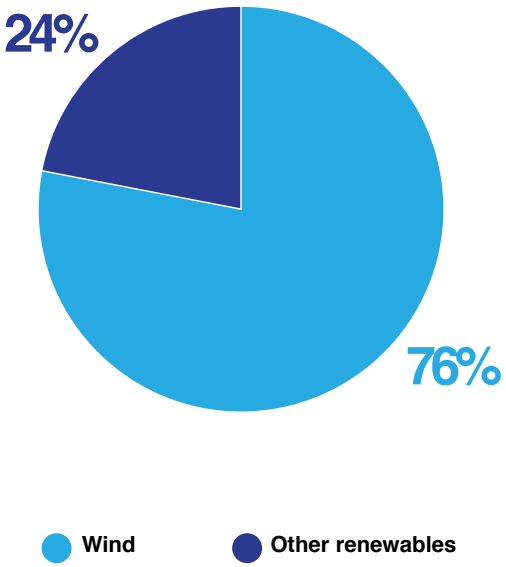
Key Clean Energy Targets (2020)

Wind	20,000 MW by 2023
Geothermal	600 MW by 2013
Solar	600 MW by 2013

Key Investment Incentives

Wind, Solar, Geothermal	Feed-in Tariffs
Wind	Equipment exempt from Value Added Tax (VAT) and customs duty

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



National Clean Energy Policies

	Carbon Cap		Auto Efficiency Standards
	Carbon Market	✔	Feed-in Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
	Clean Energy Tax Incentives		Green Bonds

UNITED KINGDOM

The United Kingdom saw a sharp 70 percent decline in clean energy investment, dropping the nation out of the top 10 among G-20 countries. Investments in 2010 totalled $3.3 billion, compared with 2009 levels over $11 billion. Fifty-two percent of clean energy investments were directed to wind energy. A sharp decline in offshore wind energy investments and uncertainty surrounding the policy perspective of a new government appeared to have stunted 2010 investments.

Finance and Investment (2010)

Total Investment	$3.3 billion
G-20 Investment Rank	13
Percentage of G-20 Total	1.6%
5-Year Growth Rate	49%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	7.5 GW
Percentage of G-20 Total	2%
5-Year Growth Rate	21%
Key Renewable Energy Sectors	
Wind	5,200 MW
Biomass	2,000 MW

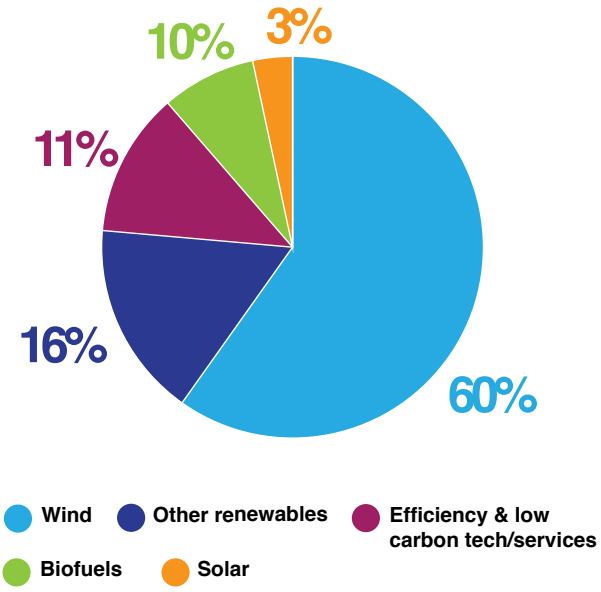
Key Clean Energy Targets (2020)

Renewable Energy	15% of final energy consumption
Transportation	Renewable energy 10% of total fuel consumption

Key Investment Incentives

All Renewable Energy	Feed-in Tariffs

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



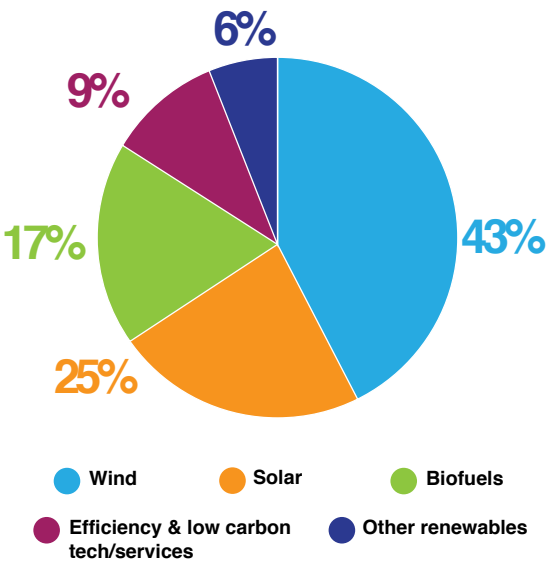
National Clean Energy Policies

Carbon Cap	Auto Efficiency Standards
✔ Carbon Market	✔ Feed-in Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

UNITED STATES

Despite a 51 percent increase in clean energy investments in 2010, the United States dropped to third place among G-20 members with a total investment of $34 billion. At 11th place among G-20 members in terms of five-year growth in clean energy investments, and in view of ongoing policy uncertainty, the United States competitive position is at risk. Fifty percent of clean energy investment in the United States was directed to the wind sector, which added 5 GW of capacity. Another 30 percent of investment was directed to solar. The United States led the world in energy efficiency investments, with $3.3 billion invested. The United States continues to dominate venture capital finance and technology innovation, but it lags in manufacturing.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



Finance and Investment (2010)

Total Investment	$34 billion
G-20 Investment Rank	3
Percentage of G-20 Total	17%
5-Year Growth Rate	61%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	58 GW
Percentage of G-20 Total	15%
5-Year Growth Rate	30%
Key Renewable Energy Sectors	
Wind	39,270 MW
Solar	3,100 MW

Key Clean Energy Targets (2022)

Biofuels	36 billion gallons

Key Investment Incentives

Wind, Solar	Production Tax Credit / Investment Tax Credit
Cleantech	Federal loan guarantees
Wind, Solar, Power Storage	Federal Manufacturers Tax Credit

National Clean Energy Policies

	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market		Feed-in Tariffs
	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

OTHER EU-27*

The European Union countries not profiled independently in this report accounted for $13.4 billion worth of clean energy investments in 2010, making it fifth overall among G-20 members. Investments increased a modest three percent in 2010. These nations have a total installed renewable energy capacity of 39.8 GW. The EU has strong community-wide targets, including 10 percent of electricity produced from renewable sources by 2010 and five percent of fuel consumption from biofuels by 2020. The EU's community-wide carbon and energy policies encourage clean energy investments throughout the region.

Finance and Investment (2010)

Total Investment	$13.4 billion
G-20 Investment Rank	5
Percentage of G-20 Total	7%
5-Year Growth Rate	62%

Installed Clean Energy (2010)

Total Renewable Energy Capacity	39.8 GW
Percentage of G-20 Total	10%
5-Year Growth Rate	45%
Key Renewable Energy Sectors	
Wind	20 GW
Solar	3.5 GW
Biomass	11.5 GW

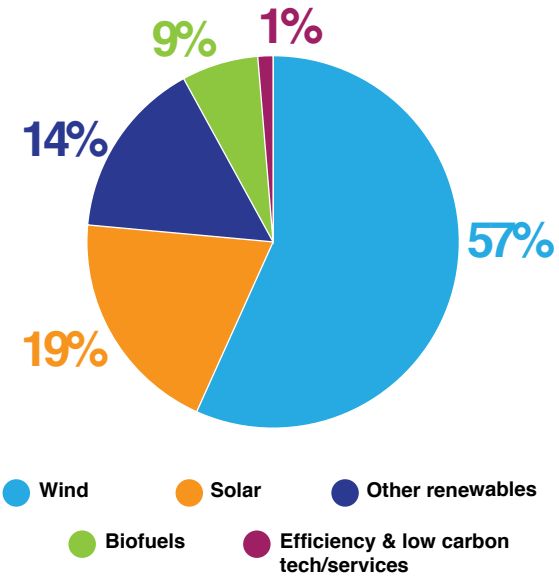
Key Clean Energy Targets (2020)

Renewable Power	20% of final energy consumption
Transport	10% of total fuel consumption from renewable energy

Key Investment Incentives

All	Feed-in Tariffs
Sweden, Poland, Romania, Belgium	Quota Obligations & green certificates
Netherlands	Green premiums, investment subsidies

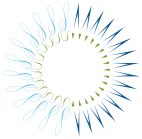
DISTRIBUTION OF INVESTMENT BY SECTOR (2005-10)



National Clean Energy Policies

- ✔ Carbon Cap
- ✔ Carbon Market
- ✔ Renewable Energy Standard
- ✔ Clean Energy Tax Incentives
- ✔ Auto Efficiency Standards
- ✔ Feed-in Tariffs
- ✔ Government Procurement
- ✔ Green Bonds

* Does not include data for Spain.



THE PEW CHARITABLE TRUSTS

Philadelphia, PA
Tel. 215-575-2000

Washington, DC
Tel. 202-552-2000

www.pewtrusts.org